MAY 1955

plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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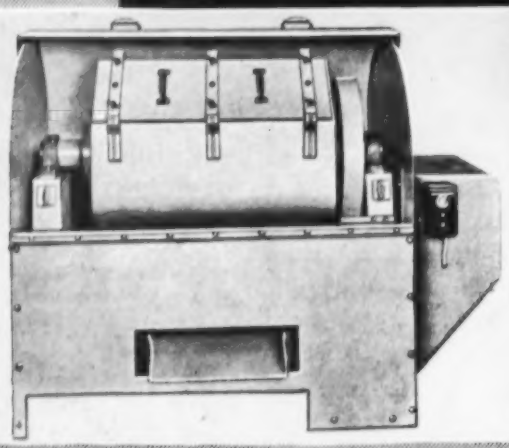

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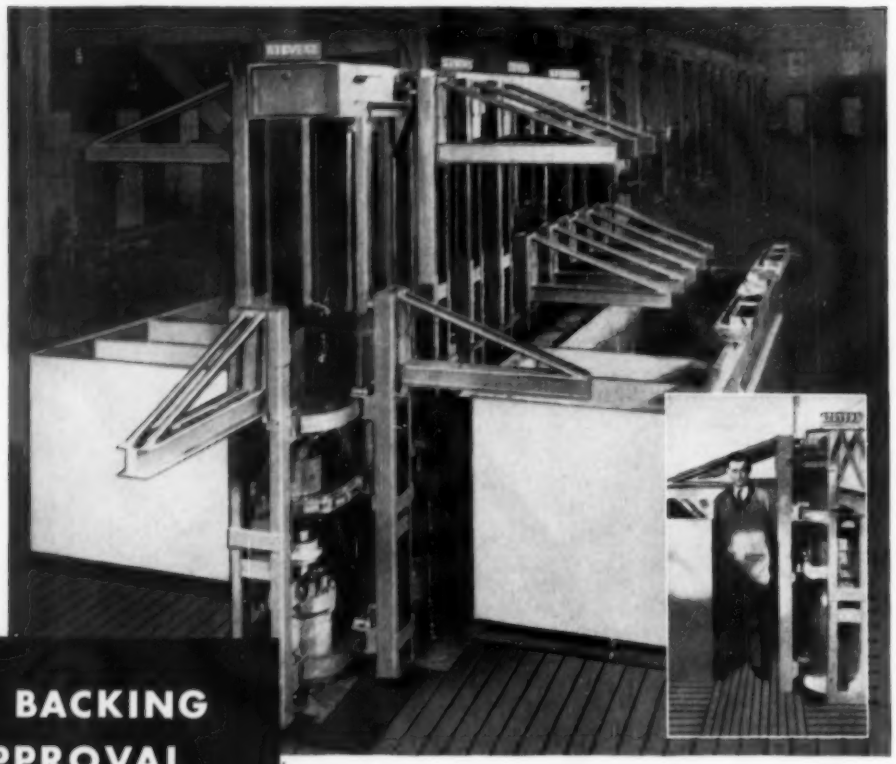

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Discriminating metal finishing experts who have viewed it in operation are strong in their approval of the "Stevadoer," new automatic plating and processing machine by Stevens . . . and they are backing up their approval with orders.

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Dedicated to the improvement and dissemination of the knowledge of the arts and sciences of electroplating and of finishing of metals and of allied arts

plating

Journal of the American Electroplaters' Society

May 1955 **Vol. 42, No. 5**

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Editorial

WATER! WATER!! WATER!!!

WATER and water pollution problems offer increasing restrictions throughout the country today. These problems apply not only to the plating and metal finishing industry, but to other industries as well.

It is reported that our country as a whole has plenty of water reserve. However, local shortages exist in many areas; but these areas of shortages are increasing and continue to offer many headaches—financial, production and public relations—to plant owners. The problem becomes more aggravated in this era of decentralization because of the increased restrictions as to selection of plant location.

Canals, long pipe lines, cooling towers, purifying equipment, rainmakers, sewage treatment are some methods used to alleviate local shortages.

But in addition to water shortage, there is the problem of pollution. This is one of the worst water problems. Differences of opinion between industry and Government are not unusual in this pollution problem. It is often contended that while industry is gradually coming to recognize waste treatment as an important production problem, governmental authorities are not generally facing facts realistically enough, particularly the fact that streams should serve as carriers of waste as well as sources of water supply and recreational resources.

Forty-five states now are reported to have pollution control laws of some type and the Ohio River Valley Water Sanitation Commission, in which the American Electroplaters' Society is represented, is doing much to focus attention on and to take remedial action in the matter of water pollution. The AES has expended thousands of dollars of research funds in an attempt to solve the waste disposal problem and projects on water treatment and waste disposal are now in progress at Yale University and at Michigan State College.

Unfortunately, water pollution laws in too many states are not stringent enough. In some states, laws are purely directive and have no enforcement provisions, but on the whole it appears that states are strengthening their water pollution laws.

The strengthening of water pollution laws should bring about greater standardization and uniformity among states. Indeed, it is not inconceivable that industry will be able to build a plant at an advantage over another because the first state does not have rigid requirements or has a more lax law. When this happens, community public relations, that is, the job of obtaining ready acceptability of a plant or firm by the citizenry in an area will also be an easier and less expensive chore. The time will come, too, when management will be able to concentrate more on the economic aspects of water, that is, to the physical characteristics of streams as related to a company's location requirements.

P. Peter Kovalis

EXECUTIVE SECRETARY, AES

TYGON "ATD" Hot Spray PAINT

Tygon "ATD" Hot Spray Paint builds a film thickness of 3 mils or more at a single pass—5 mils or more in two coats—a film thickness that would require six or more coats of conventional cold spray vinyl paints. Adhesion is better. Film continuity (because of the thicker and denser film) is immeasurably improved. And, of course, the proven corrosion-resistance of Tygon Paint is in no way impaired.

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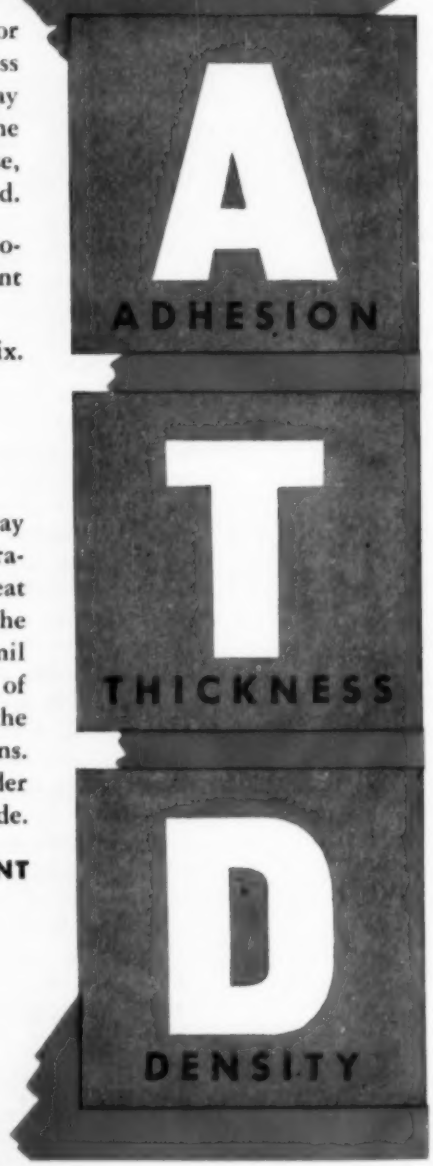

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Tygon "ATD" Hot Spray Paint is heated in a conventional hot spray heater to a temperature of approximately 160° F. At this temperature, the viscous Tygon "ATD" Hot Spray Paint becomes fluid. Heat does the work of thinners. As the hot paint leaves the gun, the solvents in the paint evaporate, and a high solids content, 3 mil thick protective coating is deposited on the target. Because most of the solvent has evaporated before the paint hits the target, the coating dries quickly. The finish is excellent, without sags or runs. The film is dense, free from pin holes, and resistant to a wider range of corrosives than any conventional protective coating made.

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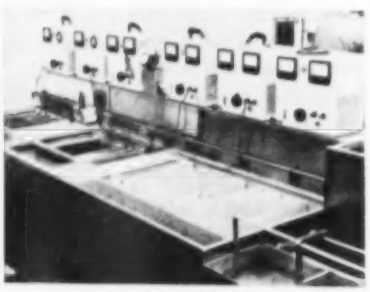
Industry News

The Udylite Corporation concluded its 3-day National Sales Meeting with a banquet at which service awards were presented to 17 men employees by Clyde H. Reeme, president. Ten men received 15-year bronze lapel buttons. Six men received 20-year buttons gold watches. L. K. Lindahl, Chairman of the Board of Directors, received a gold lapel button commemorating his 30 years of Udylite service. These presentations raised the Udylite Service Club membership to a total of 51, all of whom have served Udylite 15 years or more. The total service represented by the Club members is 935 years

New Designed Plating Tanks. Four plating tanks of new design have recently been installed in the plating department of the Bulova Watch Company at Bulova Park, Long Island. They were manufactured by Schori Process Division of



Tanks for Bulova

Ferro-Co Corp., of a chemically resistant laminated fiberglass called Iolyte. Manufacturer claims this material is as strong as steel, pound for pound, although only one-fifth its weight, and resistant to all chemicals used in plating plants. Also that it may be fabricated to any specifications, in any shape or size. No molds are needed.

Used for watch dial plating, each tank serves a different function . . . numeral plating, preparation for silver plating, color plating, and acid line. Approximately 10x3x3 ft., each tank has up to 12 compartments for dip and spray rinses. Compartments are designed to provide a continuous flow of fresh water for dip rinses. The tanks have from one to three inlets and drains instead of one inlet and drain for each compartment, facilitating the plumbing problem. Provision is made for agitators and steam coils. The outsides of the tanks are clad in stainless to conform in appearance with the other modern equipment in the plant.

New Corporation Formed. The recently formed Macarr, Inc. manufacture a complete line of standard rectifier units, unique however is their ability to add "Automation" techniques to such equipment whether new or already in service. Saturable reactors and magnetic controls is one of their main systems.

They are also engineering rectifier control packages that increase the efficiency of operation of automatic plating conveyors. Small investments made on redesigning such controls have proven to save the user time and money by decreasing rejects and increasing production due to operator's increased efficiency.

A list of their products are: transformers and choke coils; saturable reactors; magnetic amplifiers; bench type rectifier units; large power rectifier units.

There is a complete service and engineering staff for the repair, maintenance, and redesign of all makes and types of rectifier equipment and controls. Macarr, Inc. is located at 2458-60 Arthur Ave., Bronx 58, N. Y.

Robertshaw-Fulton Plant Wins Safety Award. A. J. Stinebiser (left), superintendent of Robertshaw-Fulton Controls Company's Scottdale (Pa.) plant and Steve Hollis, president of Scottdale Local 3964, CIO-United Steel Workers Union, hold National Safety Council plaque won by the plant in a nationwide industrial safety contest. The Scottdale plant was winner in Group C, Foundries Division as one of 126 entrants with 12 months free of disabling or "lost time" accidents. Over 1,100 companies in various industries were in the competition

Shown in the front row of the photo, left to right, are: Andrew Liger, Head Wyandotte's Industrial Research Laboratories; James L. Ramsey, Manager Railroad Sales; F. H. Tholen, Sales Manager; Ford Ballantyne, Sr., Vice-President, Secretary and Treasurer; Ford Ballantyne, Jr., Vice-President and General Manager of the J. B. Ford Division; Robert B. Semple, President, Wyandotte Chemicals Corporation; P. N. Burkard, Manager Industrial, Railroad and Aircraft Department; Robert J. Racine, Manager Industrial Sales; and C. E. Smith, Administrative Assistant to Ballantyne, Jr.

thank you, Mr. Curtice . . .

Our sincere appreciation to GENERAL MOTORS CORPORATION and its president, Harlow H. Curtice, for the high honor represented by this certificate of recognition.

We hope we will continue to have the privilege of serving you on the occasion of the production of your *100* millionth vehicle.

AMERICAN BUFF CO.
IN RECOGNITION of its contribution to and membership on a production team responsible for an achievement unparalleled in industrial history—the building by General Motors in the United States of fifty million motor vehicles.
ON THE OCCASION of the production at the Chevrolet Assembly Plant at Flint, Michigan, this Twenty-third of November, Nineteen Hundred Fifty-four, of GM Vehicle No. 50,000,000.
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Industry News

New Plant for Copper Pigment and Chemical Works, Inc. A new, large-capacity chemical plant for the production of nickel sulphate has attained the final stages of installation at the Copper Pigment and Chemical Works in Elizabeth, N. J. The new plant will establish the Copper Pigment and Chemical Works as a consistent primary supplier of the vital plating chemical.

The competitive position of nickel sulphate will undoubtedly be of great advantage to the electroplating industry, particularly to processors such as automotive plating plants and appliance manufacturers, who employ large quantities of the material in the secondary nickel undercoating of chrome-plated hardware and fixtures.

Pennsalt to Develop Fluorspar Resources. To provide a long-range supply of acid grade fluorspar for its Calvert City, Ky., fluorine chemicals plant, the Pennsylvania Salt Manufacturing Company announces the incorporation of a new, wholly owned subsidiary and its plans for the development of mining and milling operations at nearby Salem and Mexico locations.

The new enterprise will be known as the Calvert City Chemical Company. With construction already in progress, the new facilities are expected to go into production toward the close of the year. Operations will be integrated with the activities of the Calvert City Works.

Substantial quantities of Pennsalt's anhydrous hydrofluoric acid are used in atomic energy projects. Other uses include the production of aviation gasoline, "freons"—used in refrigerants and as propellants in aerosol bombs, elemental fluorine and many important fluorides. Aqueous hydrofluoric acid is employed in the descaling and polishing of stainless steel, to frost television tubes and electric bulbs, for etching and polishing of glass ware, and in the synthetic production of Cryolite, an essential material in the aluminum industry.

Most Modern

Lab for Vea Chemical Co. Vea Chemical Company, manufacturing chemists, announce the opening of their new laboratory in their plant at Cleveland, Ohio. The completely modern equipment and facilities will be used to further research and development of B.R.P. Electroless Nickel.

Their catalog, revised to cover the recent innovations in their process, may be had on request, and the services of their laboratory are offered without charge in processing experimental and sample parts as submitted.

Speakers for 1955-1956 Season

Many firms have offered the services of their people as speakers at Society meetings. We are very grateful for these offers and assistance in this, one of the major educational efforts of the American Electroplaters' Society.

On April 11 we mailed a copy of the speakers' list to each Branch Librarian and Secretary. Therefore members who are interested in hearing a speaker on a specific subject should check with their Librarians.

(Note: An up-to-date list of educational films is also being prepared and should be in the hands of Branch Librarians shortly. S. Knight of the Boston Branch is compiling this list.)

CLYDE KELLY,
1st Vice-President
American Electroplaters' Society (National Educational Chairman)

NO ANODE SLUDGE

with NEW Anaconda "PLUS-4" ANODES*

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+2 no copper "build-up" in solution

+3 smoother, denser cathode deposits

+4 up to 15% *more* cathode deposits

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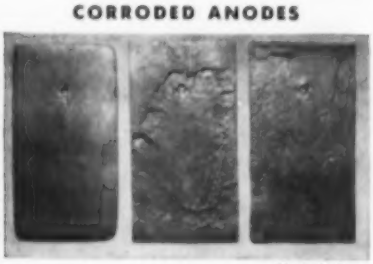

Phosphorized Copper | Fire Refined Copper | Electrolytic "Tough Pitch" Copper

"Plus-4" Anode, far left, shows even, uniform corrosion. Irregular corrosion shown by other two anodes results in high scrap loss.

*For use under Patent No. 2,689,216

Here's a new copper anode for acid copper plating which eliminates "sludging off" of copper particles to form sludge in the tank, "build-up" of copper in the electrolyte, and cathode roughness due to lodgment of copper particles. No "bagging" or diaphragms are required.

In addition to overcoming these troublesome and costly acid copper plating problems, "Plus-4" Anodes plate more copper per pound of anode and corrode to a small, compact "fish" with considerable saving in scrap. "Plus-4" Anodes are furnished in all standard sizes and shapes and cost no more than ordinary rolled copper anodes.

SPECIAL TRIAL OFFER — for details on how you can get enough "Plus-4" Anodes to fill one tank, write to *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ontario.*

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"COPPER CORE" Chromium Anode

"Copper Core" is chemically bonded homogeneously to the lead for its entire length. The entire hook is lead covered for additional protection.

- **This Anode** will conduct 250 amperes based on copper area alone.

  Natural flow of current makes entire surface self-cleaning, insuring complete saturation, instant distribution of current, and unusual throwing power. Greatly reduces plating time for a given thickness of deposit.

- **"Copper Core"** distributes current equally throughout the entire length of anode.

  The anode is insulated above and below the solution level—which prevents flow of heavy surface currents and burning off at solution line. Conductivity is uniform at all solution levels, regulated only by the cathode depth.

- **"Copper Core"** and point current construction, aids in immediate coverage.

  A one-piece copper hook maintains perfect contact—no heating at point of contact, no current failures to solution. "Copper Core" Anodes do not warp out of shape.

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30%

For example, an anode that formerly cost $34.00 is reduced to $23.00. Now you can charge your tanks with the unequaled Copper Core Chromium Anode at the same cost as with conventional anodes. Here's how:

Space our Copper Core Anodes on 8″–14″ centers, which is all that is usually required. Then note the difference: immediate coverage, excellent throwing power, and additional current density, plus four to five years of service. This is your real opportunity to become acquainted!

Write for quotation today. Simply tell us the length of your anodes and the number required, or use the coupon on this page. We will quote on 5% tin-lead alloy unless otherwise specified. You will have our prices promptly—and deliveries are good.

• • •

Our thanks to the trade for its booming demand for our outstanding Copper Core Chromium Anodes. Introduced five years ago, they have enjoyed a rapidly growing market which has made possible this price cut through immensely increased production.

THE GILBERT TRAMER CO.
1217 Main Avenue
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Please send us promptly your quotation on Copper Core Chromium Anodes as follows:

Length	No. Required	5% tin-lead	Other .....
Length	No. Required	5% tin-lead	Other .....
Length	No. Required	5% tin-lead	Other .....

Individual .....

Company .....

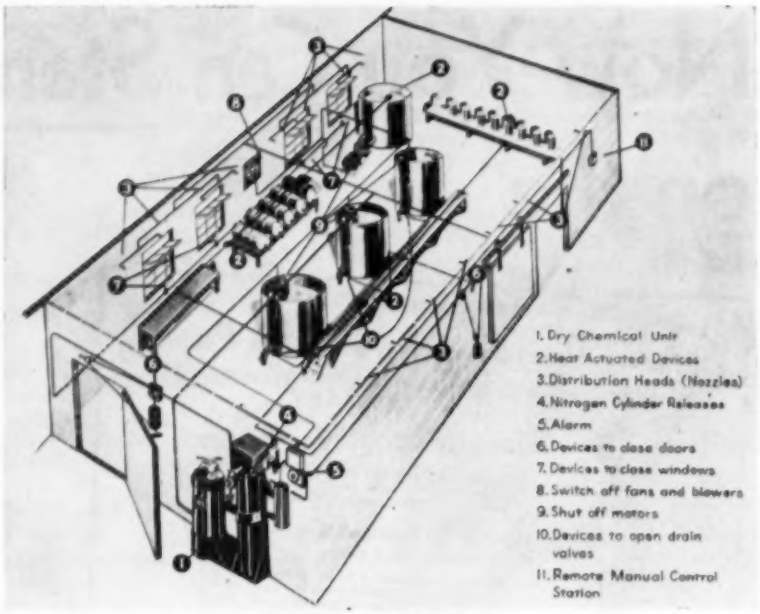
Address .....

Industry News

Underwriters Labs Approved Dry Chemical Piped System for First Time. Underwriters Laboratories, Inc. has granted approval to the dry chemical piped system of fire extinguishment developed by the Ansul Chemical Company, Marinette, Wis.

This marks the first time any dry chemical piped system has been listed by a recognized approval agency. The listing follows one of the most exhaustive series of tests ever conducted on a special fire extinguishing system. More than 1,600 tests were conducted over a period of five years.

With this system, automatic fire protection is provided against Class B and Class C fire hazards by means of dry chemical, which is conveyed through pipes and expelled in the area surrounding the hazard.


1. Dry Chemical Unit
2. Heat Actuated Devices
3. Distribution Heads (Nozzles)
4. Nitrogen Cylinder Releases
5. Alarm
6. Devices to close doors
7. Devices to close windows
8. Switch off fans and blowers
9. Shut off motors
10. Devices to open drain valves
11. Remote Manual Control Station

Piped powder to fight fires!

The approval means that dry chemical piped systems can be installed to protect such hazards as paint dip tanks and spray booths, ovens, driers, oil quench tanks, flammable liquid pumping stations, transformer vaults, diesel and gasoline engines, generators, oil storage tanks, flammable liquid storage rooms, asphalt saturators and marine hazards.

The automatic systems are operated either by pneumatic rate-of-rise type of heat detection devices or by electrically operated releases. Within a few seconds after detection of a fire, dry chemical is discharged through strategically located heads distributed in the fire area.

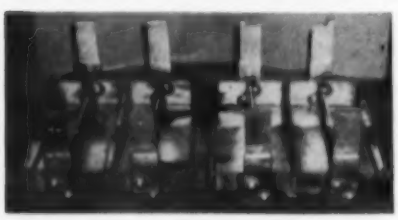
Doors, windows, ventilation ducts, operating valves, etc., can be closed automatically by the system's nitrogen pressure. An electric switch energized when the system operates turns off fans and machinery and sounds alarms around the plant or in a central fire alarm headquarters.

By using automatic selector valves, one piped system can protect two or more separate hazards. Dry chemical flows only into the piping that leads to the fire area involved.

The piped systems may be designed for either local application or total flooding. Each type of system is engineered by Ansul's Special Hazards Section to meet the customer's specific requirements.

Order the best —call for Anodes by STORTS

When you need standard or special lead anodes—in plain or fancy design—Storts is always prepared to serve them to your order—with complete satisfaction guaranteed. And Storts anodes have a long standing reputation for high-performance utility.



This partial order of tray type lead anodes is typical of how dependably your special designs to meet special conditions are executed in our Anode Department. Let us quote on your present needs or assist you in designing special anodes for your requirements.

42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

NEW SUSTAINING MEMBERSHIPS

Two more organizations have joined the AES Research Sustaining Membership program:

American Electro Products, Inc.
Waterbury, Conn.

Millhorn Chemical & Supply Co.
Los Angeles 1, Calif.

Industry News

Crippen Machine and Tool Company Has Been Purchased by Western Metal Specialty Company of Milwaukee. Otto Boheim, president of Western Metal Specialty Company of Milwaukee, announces the purchase of the Crippen Machine and Tool Company of Jackson, Mich., by the Milwaukee Company. The purchase, according to Boheim, will provide Crippen with the necessary finances for future business growth in order to serve an expanding list of customers. Crippen Machine and Tool Co., the largest producer of small deep drawn and fabricated fuel tanks in the country, will now be able to handle orders in virtually any quantity, for all sizes of fuel tanks, from 1 quart to 80 gal.

Arnold O. Beckman, Inc., Announces New Custom Products Department. An important unit was added to Arnold O. Beckman, Inc. operations recently with the formation of a Custom Products Department headed by Robert W. Negus.

Negus

Over recent years, there has appeared a growing demand for instruments and auxiliary equipment for specialized applications. Because of this demand, the Custom Products Department was created to handle work of this nature. By establishing separate administrative and manufacturing facilities for the new department, the company can give full and prompt attention to the special requirements of customers. Also, operation of the Custom Products Department as a separate function will allow it to progress side by side with the manufacturing facilities of the plant which produces the regular line of Arnold O. Beckman instruments. More detailed information about the Custom Products Department is available from Arnold O. Beckman, Inc., 1020 Mission Street, South Pasadena, Calif. When writing, please submit sufficient data on the type of development in which you are interested to facilitate a prompt and informative reply.

Technic Opens Chicago Office. For the convenience of electroplaters of precious metals in the Midwest, Technic Inc. has opened an office at 7001 North Clark St., Chicago 26. Growing use of electroplated precious metals for industrial, scientific and decorative applications prompted the step, according to Technic officials, to provide prompt on-the-spot service in Chicago and surrounding areas. Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Delaware, Rhode Island, New York, Maryland, Virginia, New Jersey, Pennsylvania (east of the Susquehanna River).

Personnel have been thoroughly trained and properly equipped, parts and test solutions will be stocked in Stratford and available to customers in this area.

This new arrangement will not only make service more readily available, it will also reduce transportation costs.

Technic Inc. has pioneered in development of scientifically controlled precious metal plating solutions, equipment and methods. Products include controlled electroplating equipment, potassium gold cyanide, sodium gold cyanide, rhodium sulfate, palladium plating solution, platinum plating solution, immersion tin, and Protectox silver and copper anti-tarnish.

Informative technical data sheets giving complete facts about each of the company's products are available on request from either the new Chicago office or Technic Inc. at 39 Snow St., Providence 1, R. I.

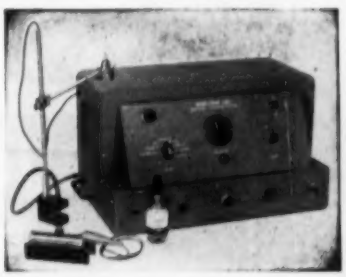
Carborundum Builds. The Carborundum Company has just completed two new warehouse and office buildings in California, and has reorganized sales, engineering and other services in the West into what is now designated the Pacific District, which includes the area west of the Rockies. John G. Fritzinger, formerly a sales executive in Niagara Falls, N. Y., has been named manager of the district, according to an announcement by Gen. Clinton F. Robinson, president of the company.

The new warehouse and office buildings are located near Los Angeles and San Francisco. The Los Angeles structure, located at 2626 South Malt Ave., provides 13,000 sq ft of floor space for warehouse functions and 2,000 sq ft for office operations.

Just A Minute . . . and YOU can be SURE of the Plating Thickness

with the

KOCOUR ELECTRONIC THICKNESS TESTER



Here's why!

A minute is the time required for the average test . . . a relatively short time to check your work and be sure it's right. No more guesswork checking graphs or charts . . . readings are direct from the instrument panel, accurate to within 90-95%. Now you can determine the thickness of decorative chromium, hard chromium, silver, tin, cadmium, zinc, brass, copper, nickel, lead, tin-zinc alloy and other plating on various base materials and metals including steel, copper, brass, aluminum, plastics, etc. The minimum thickness which can be determined is 5 millionths of an inch (5 ten millionths for chromium).

Write for literature today, see how the Electronic Thickness Tester can solve your problems. We guarantee satisfaction.

KOCOUR CO.

4801 S. St. Louis Avenue

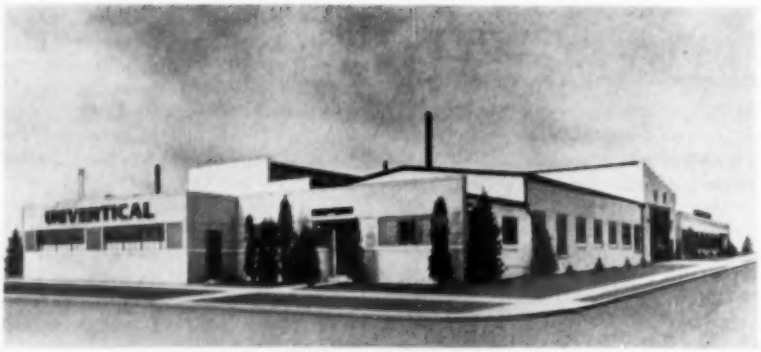
Chicago 32, Illinois

Pioneers in Control Sets for the Electroplating Industry

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 510.

Industry News

The other one-story building erected at the corner of Alviso Road and Evelyn Ave., Mountain View, Calif., (near San Francisco) provides 18,000 sq ft of floor space for warehouse use, 2,000 sq ft for lathe room and service area, and 1,600 sq ft for office functions. Both facilities are convenient to railroads and main highways and are equipped with car height loading docks and modern materials handling facilities.



16,000 Square Feet—All New

Plant for Univertical. Univertical Foundry & Machine Company, 14841 Meyers Road, Detroit 27, Mich., has just completed the installation of five one-ton capacity Detroit Rocking Electric Furnaces for casting and recasting of nickel anodes, these furnaces having a potential capacity of 7500 pounds an hour.

Univertical Foundry & Machine Company has been an important manufacturer of anodes for the plating industry since 1939. The new plant embraces 16,000 square feet of manufacturing, engineering and laboratory facilities.

The casting of pure nickel anodes calls for furnaces such as these capable of producing uniform results at high controlled temperatures. Indirect arc heat provides fast, controlled melting of nickel, while holding variation and carbon pickup to a minimum. Constant motion assures homogeneity of the metal.

Automatic Rotary Plating Machine Installed at American Plating. A large, automatic rotary plating machine for zinc plating has just been installed at the new American Plating plant in Zelienople, according to Dr. L. E. Lancy, vice-president.

Around and Around

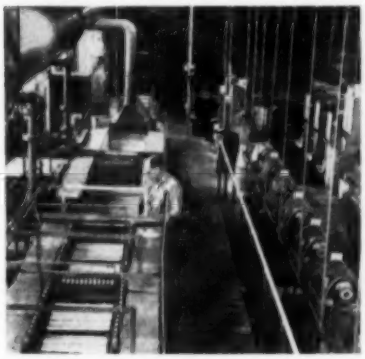
The capacity of this new machine enables American Plating, Inc., to solve many of the most difficult industrial plating problems. It is believed to be the only job plating machine of its kind in the Tri-State district.

Odd shapes as large as 12 x 6 x 2 feet can be automatically electrogalvanized. The machine is seated in a pit 35 feet in diameter. Its component parts include an "umbrella" of ten arms suspended from a central, hydraulically operated lifting and rotating unit. Weight capacity allows more than a ton of metal to be rotated and immersed in several large tanks of plating and rinsing solutions.

American Plating, Inc. also has complete barrel-line facilities for electroplating in hard industrial chromium, zinc, copper, tin and other metals.

Industry News

Brass-Plated Steel Wire Cord Tires. Jones & Laughlin Steel Corp., Pittsburgh, Pa., developed a way to reinforce rubber and synthetic tires with a brass-plated steel wire cord to make a tire that just won't blow.



Tire Wire

Since rubber won't adhere to steel, new machinery had to be conceived and developed, wire had to be drawn finer than the plant had ever used before, and wire had to be plated with brass.

The cord is finding even more applications in rubber products. Some manufacturers are putting it into power transmission belts, and into conveyor belts where it enables the belt to carry a heavier load without a great increase in the weight of the belt. It is being used also to reinforce high pressure hoses. Engineers there feel that this strong, lightweight reinforcing wire cord will find many other applications, not only as a rubber reinforcing agent, but for use with other materials such as plastics. And to J&L, this can mean the opening of an entirely new field, one in which steel never has been used before.

Carborundum Acquires Curtis. The Carborundum Company, Niagara Falls, N. Y., has acquired the Curtis Machine Corporation, according to a joint announcement by General Clinton F. Robinson, president of Carborundum and Gene DeMambro, president of Lincoln Park Industries, Inc. of which Curtis Machine was a wholly owned subsidiary. Carborundum exchanged 8,696 shares for the entire capital stock of Curtis Machine.

DeMambro, president and general manager of Curtis Machine since 1946, will continue in that capacity, reporting to Wm. H. Wendel, vice-president in charge of Carborundum's Coated Abrasives Division in Wheatfield, N. Y. Wendel will coordinate the activities of Curtis Machine in the Carborundum Company.

Curtis Machine Corporation, operating in Jamestown, N. Y., since 1913, pioneered in the manufacture of belt sanders and rubbing machinery for the furniture industry. For the past 10 years under DeMambro's presidency, the company has developed many new machines introducing the principle of abrasive belt grinding in the metal industry.

The uses of abrasive belts have multiplied so rapidly that many industrial plants are unable to keep abreast of developments. To help meet this need, Carborundum built a giant mobile Abrasive Workshop and equipped it with modern abrasive belt machines. This traveling unit goes to customers' plants and demonstrates the latest abrasive belts and belt machines. In 4 months it has traveled over 27,000 miles and had over 7,500 guests aboard.

The joint statement said, "The purchase of Curtis Machine by Carborundum makes possible close integration of Curtis Machine's engineering skill in abrasive belt machine building and Carborundum's abrasive belt engineering know-how. The move is intended to provide new abrasive belt machines and improved abrasive belts for industry with greater speed and economy."

Warner Electric in Switzerland. A new European subsidiary company has been organized by the Warner Electric Brake & Clutch Company, Beloit, Wis., it has been announced by Steven P. J. Wood, president of the firm.

The new firm, Warner-Electric, Ltd., is located in Zurich, Switzerland, and will be managed by Otto Boss, Swiss engineer experienced in the importation of American machinery and components.

According to Wood, the subsidiary firm will handle sales and service of Warner Electric brakes and clutches throughout the European continent. In 1955 the firm expects to set up manufacturing facilities in Germany under a licensing arrangement.

When you think of finishing & deburring

think of Hammond

The experience gained in over 70 years of machinery building has provided us with a bank of "Know-How."

Hundreds of manufacturers have found more efficient means of parts finishing by drawing on our bank of "Know-How." The Hammond "family" of Automatic Deburring and Finishing Machines covers a wide range of types and sizes.

Our business is to share this knowledge with you, in order to bring down high deburring and finishing costs. We would like to help you, too.

Hammond Machinery Builders
1613 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

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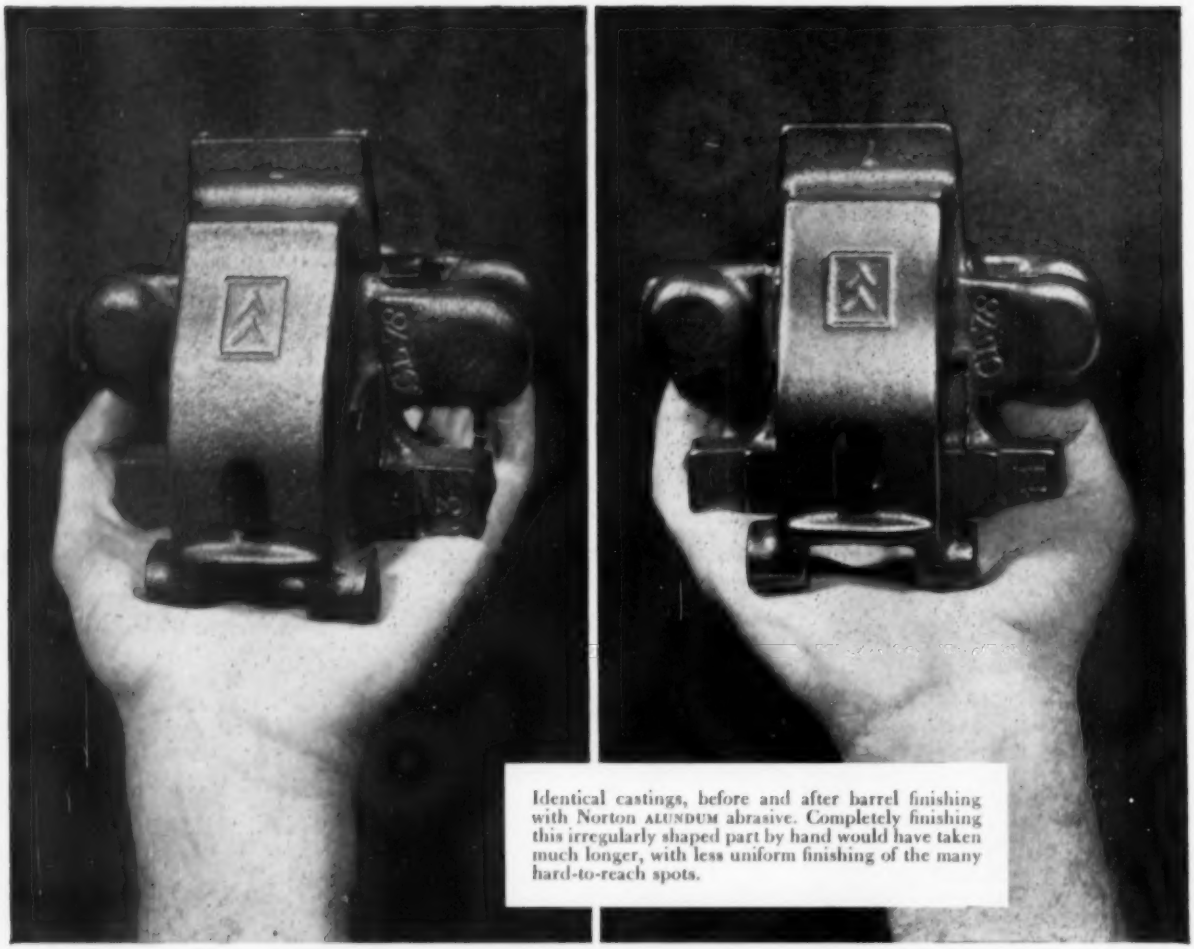

Identical castings, before and after barrel finishing with Norton ALUNDUM abrasive. Completely finishing this irregularly shaped part by hand would have taken much longer, with less uniform finishing of the many hard-to-reach spots.

ALUNDUM* tumbling abrasive tames another tough one!

Intricate parts finished faster, more thoroughly, when Norton abrasive adds the "TOUCH of GOLD"

The trickier, more intricate the parts, the easier it is to see the many advantages of barrel finishing with ALUNDUM tumbling abrasive. Hand finishing the casting illustrated, for example, would have been a long, tiresome chore — and an uneven job at best, due to the many irregularities of shape.

For parts ranging from even heftier castings down to tiny needles, there's nothing like ALUNDUM abrasive to bring out *all* the benefits of barrel finishing. This typical Norton abrasive development is sharp, dense, hard and non-fracturing. Its blocky shape eliminates slivers and chips in the tumbling process. In your tumbling barrels it assures:

- *Highest uniformity of radii and surfaces, with brightest, smoothest finish.*
- *Continual savings of man-hours, by reducing tumbling cycles, scrap and reworking to minimum.*

See Your Norton Distributor

for further facts on how ALUNDUM abrasive can add the time-saving, profit-boosting "Touch of Gold" to your finishing operations. Ask him for the new 55-page booklet on barrel finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G787

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

Making better products... to make your products better

and its BEHR-MANNING division

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ONE IDEA

seen at the

1955 Industrial Finishing Exposition

and

42nd Annual Convention American Electroplaters' Society

may save your company thousands of dollars!

PLAN NOW TO ATTEND JUNE 20 · 21 · 22 · 23, 1955
PUBLIC AUDITORIUM, CLEVELAND, OHIO

Times have changed! There have been many important advances in the industrial finishing industry. There is a great need for knowledge and information about those new manufacturing processes, machinery, and improved methods in the science of industrial finishing which have been developed during the past three years.

That's why the 1955 Industrial Finishing Exposition is so important. And that is why the papers delivered at the 42nd Annual Convention of the American Electroplaters' Society will mean dollars in the pockets of the firms who attend.

The many new ideas in industrial finishing all add up to making it possible to produce better finished products at a lower cost.

All sessions of the 42nd Annual Convention of the American Electroplaters' Society will be held under the same roof with the Industrial Finishing Exposition . . . the only show since 1952. You will see . . .

1501 IDEAS FOR THE ADVANCEMENT OF THE SCIENCE OF INDUSTRIAL FINISHING!

Save time—

USE THIS EXPEDITED REGISTRATION CARD

ADDITIONAL REGISTRATION CARDS may be obtained from any Exhibitor or by writing:

Harold Bartlett, Exposition Manager
4th INDUSTRIAL FINISHING EXPOSITION
American Decorating Company
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FILL IN THIS CARD COMPLETELY. Use TYPEWRITER only! Handwritten or hand-printed card not accepted. Incomplete cards subject to delay upon admission at Exposition. DO NOT MAIL THIS CARD. It is for your convenience to save your time in registering. Bring it to . . . "EXPEDITED REGISTRATION" desk at the Exposition.

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Here's an opportunity that doesn't come every year! For money-making ideas... See... attend...

1955 INDUSTRIAL FINISHING EXPOSITION *and* 42nd ANNUAL CONVENTION AMERICAN ELECTROPLATERS' SOCIETY

● The last Plating Show was held in Chicago in 1952. That means the show in 1955 provides the first opportunity in 3 years to see first hand all of the many advances made in the plating industry.

The 1955 convention and show brings a big opportunity for a mutual exchange of ideas, including engineering, research and other important know-how in the fast changing industrial finishing industry.

Progressive firms know it's important to keep up to date.

See 1001 ideas for the advancement of the Science of Industrial Finishing!

This invitation is an expedited registration card. It is intended to speed your entry into the show . . . to avoid waiting in line at the registration desk.

★ ★ ★

For further information about the Convention or Exposition, contact:

Harold Bartlett, Exposition Manager
4TH INDUSTRIAL FINISHING EXPOSITION
American Decorating Company
1349 West 24th Street
Cleveland 13, Ohio

You are cordially invited to attend the

4th INDUSTRIAL FINISHING EXPOSITION

and the

42nd ANNUAL CONVENTION

of the

AMERICAN ELECTROPLATERS' SOCIETY

Held under one roof and during the same week

CLEVELAND PUBLIC AUDITORIUM, CLEVELAND, OHIO

June 20-21-22-23, 1955

Exhibit hours:

June 20 . . . 10:00 A.M. to 6:00 P.M.
June 21 . . . 12:00 Noon to 10:00 P.M.
June 22 . . . 9:30 A.M. to 6:00 P.M.
June 23 . . . 9:30 A.M. to 4:00 P.M.

UNICHROME
Trade Mark

News about
COATINGS for METALS
Metallic . . . . . Organic . . . . . Decorative . . . . . Protective

Chromium platers make big gains

More progress reported in plants using Unichrome SRHS® Chromium Plating Solutions

Here's undivided responsibility for good plating results

When Unichrome Bright Nickel was unveiled after more than 3 years of operation, the first complete, *matched* set of plating processes became available—Unichrome Copper, Bright Nickel and SRHS Chromium.

Platers can now *unify* their operation, getting three baths that work outstandingly well together; also undivided responsibility for prompt technical help. Downtime drops. Needless expense can be avoided.

Equally important are the extra opportunities for improving output and cutting production costs through the advantages of the individual processes. For example:

A HELP IN PRODUCTION

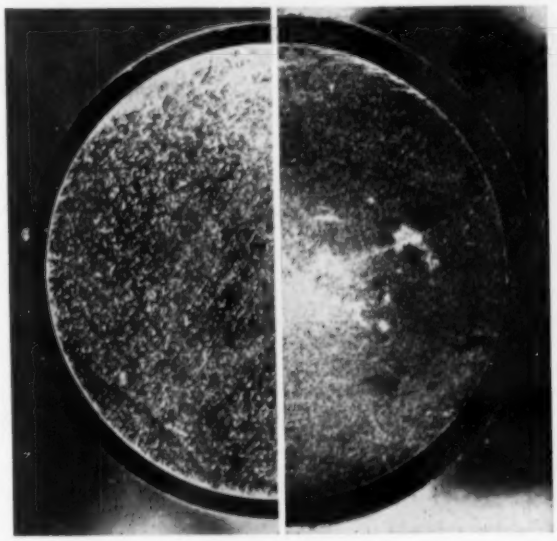
Special addition agents for Unichrome Pyrophosphate Copper enable platers to get the deposit to suit their requirements exactly. With one agent, a lustrous deposit is produced which can eliminate buffing. With another, a satin finish is produced which is ideal for buffing — permitting buffing of the free flowing copper rather than the steel or nickel.

With Unichrome Bright Nickel, deposits are obtained that are more receptive to chromium and avoid passivity problems. This stable bath also shows greater tolerance for impurities. To users this has meant reduced downtime for purification.

Send for bulletins on all three processes.

UNITED CHROMIUM, INCORPORATED

100 East 42nd Street, New York 17, N. Y.
Waterbury 20, Conn. • Detroit 20, Mich.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto 1, Ont.



Improved cathode efficiency cuts power need, ups output, saves time. Evidence of higher cathode efficiency of SRHS: Macrograph of steel rod section at left shows 0.016" of chromium deposited in 16 hours in ordinary solution. Identical rod section at right, plated in SRHS bath under identical conditions, got 0.0225" deposit — 40% more.

The working advantages of SRHS Chromium Solutions show up in different ways. Here are a number of cases to illustrate.

MATERIALS CONSUMPTION CUT

In one automotive plant, the SRHS bath replaced the ordinary chromium solution in a full automatic, resulting in a decrease of salts consumption from 500 pounds down to 300 pounds daily — saving about $3000 a year on salts alone. This saving was due partly to lower dragout loss from the more dilute solution and to diminished spray loss from the more efficient SRHS solution.

POWER CONSUMPTION CUT

At another plant, SRHS halved power consumption. 4-rack loads of bumper guards now get coverage in SRHS with 2500 amperes, whereas this same load needed 5000 amperes in the ordinary chromium solution. Existing power supplies can gain additional work capacity with Unichrome SRHS Solutions, and platers can save on power, too.

PRODUCTION STEPPED UP

Because of the increased plating speed of SRHS Solutions, work took only 2½ hours in one shop, where 3½ hours had previously been needed in the ordinary solution. Taking advantage also of higher efficiency and wider bright plate range, some plants have put through 30 to 66% more work per *cycle* with SRHS.

More information on these and other benefits derived from Unichrome SRHS Solutions can be obtained from the nearest office of United Chromium. ®*Trade Mark*

Intersociety News

Design Engineering Show Postponed

The Design Engineering Show, scheduled to be held in Philadelphia in May, has been postponed until late Spring in 1956.

Although two successful shows were held in New York and Chicago under the name of the Basic Materials Exposition, it was decided late in January to expand the concept of the exposition and the accompanying conference to encompass all aspects of design engineering. However, it was found that not sufficient time was available before the scheduled date of the 1955 show to arrange for the necessary changes required by the new concept.

1955 Plating Show to be Largest Ever Staged

According to the list of exhibitors, who have already signed up for the 1955 Industrial Finishing Exposition, the show will be much larger than the 1952 Exposition. The show is scheduled to open at the Cleveland Public Auditorium on June 20, 1955.

The Convention Committee has been actively working on plans for the show since August, 1953 and it appears that the careful, advance planning is paying off in building a larger and better show than ever.

The Industrial Finishing Exposition serves a great need in the industry and is unique in the fact that it provides a good medium for the mutual exchange of ideas between equipment builders and equipment users. The 1955 Exposition will be the first show held in three years. Those in the industrial finishing industry agree that the show in 1955 will be important because during the three-year interim, between shows, there have been many important improvements and advancements in industrial finishing equipment, processes and services.

The program at the Convention and the Exposition itself will be of interest to both organic and inorganic industrial finishers.

American Honored in Britain

England's highest award for outstanding achievement in the science of metallurgy, The Bessemer Gold Medal, has been given to an American.

The Iron and Steel Institute of Great Britain has named Doctor John Chipman, head of the department of Metallurgy at the Massachusetts Institute of Technology, its Bessemer Gold Medalist for 1955. The medal is the greatest distinction the Institute can bestow.

Announcement of Doctor Chipman's honor was made through William H. Eisenman, secretary of the American Society for Metals, largest engineering organization in the country. Dr. Chipman served as president of the ASM in 1951 and is still active in the society's widespread educational program.

The citation naming Doctor Chipman states that the award was made in recognition of his distinguished contribution to the knowledge of the physical chemistry of steelmaking.

Chipman

The Bessemer Gold Medal was established in 1873 by Sir Henry Bessemer who created a perpetual fund for the purpose of procuring annually a gold medal which was to be presented at the yearly meeting of the Institute for outstanding work in the manufacture of iron and steel.

This year, presentation of the medal has been postponed until the opening session of the Joint Metallurgical Societies in London on June 1st, which Doctor Chipman is expected to attend.

FUTURE MEETINGS OF THE ELECTROCHEMICAL SOCIETY

May 1-5, 1955, Sheraton-Gibson Hotel, Cincinnati, Ohio. Sessions on Electric Insulation; Electronics, including Luminescence, Oxide Cathodes, Phosphor Application, and Semiconductors; Electrothermics and Metallurgy; Industrial Electrolytics; and Theoretical Electrochemistry.

October 9-13, 1955, William Penn Hotel, Pittsburgh, Pa. Sessions to be announced at a later date.

April 29 and 30, and May 1-3, 1956, Mark Hopkins Hotel, San Francisco, Calif. Sessions to be announced at a later date.

October 28-31, and November 1, 1956, Statler Hotel, Cleveland, Ohio. Sessions to be announced at a later date.

May 12-16, 1957, Statler Hotel, Washington, D. C. Sessions to be announced at a later date.

October 6-10, 1957, Buffalo, N. Y. Hotel and sessions to be announced at a later date.

Doctor Chipman, associated with M.I.T. since 1937 and in his present post since 1946, has long been recognized in this country as one of the outstanding educators in the metallurgical field. He was one of the first metal scientists to recognize the growing importance of metallurgy in the atomic age.

Author of some sixty scientific papers, Dr. Chipman is considered an authority on reactions in liquid metals, vapor pressure, chemical equilibrium, and steel making. All of these are directly applicable to the research being carried on to create metals capable of withstanding the superpower of atomic energy.

Doctor and Mrs. Chipman live in Winchester, Mass., just outside of Cambridge. Their son David is a physicist and their daughter Ruth is an anthropologist.

Methods Improvement Contest

Entries are now being accepted for the Fifth Annual Methods Improvement Competition sponsored by the Industrial Management Society in conjunction with its 19th Annual National Time and Motion Study and Management Clinic scheduled for November 9-10-11, 1955 at the Hotel Sherman, Chicago.

Industrial plants and companies are invited to submit 16mm motion picture films showing the "before" and "after" phases of methods improvements made in their manufacturing, processing or office operations. The competition is divided into two sections—for companies over 1000 and those under 1000 employees. The Society will award trophies for first, second and third places as well as honorable mention prizes in both categories.

Floyd Simerson, assistant to the vice-president in charge of factories, Sears, Roebuck & Company, is chairman of the Competition. Rules and regulations for the 1955 Methods Improvement Contest may be obtained from the Society office, 35 E. Wacker Drive, Chicago 1, Ill.

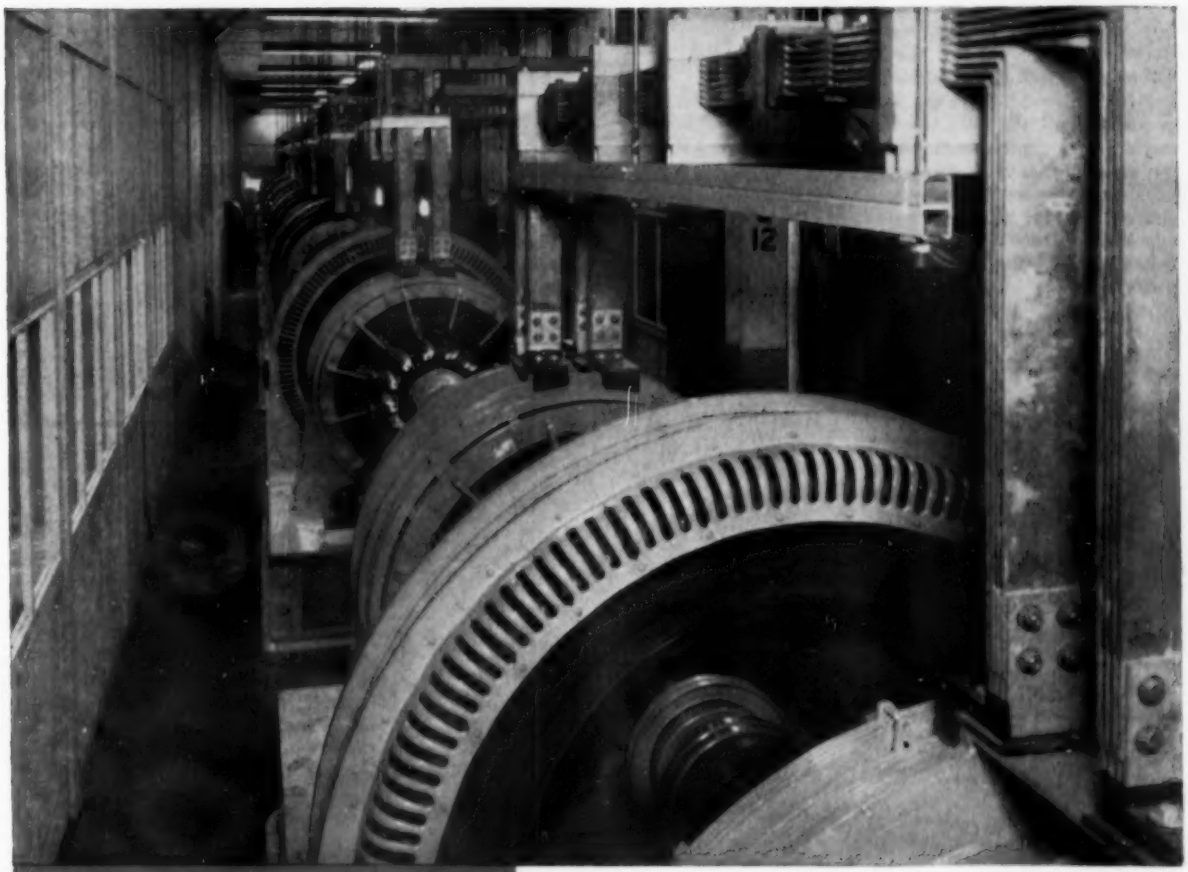
Technical Program for ASTM 58th Annual Meeting

A wide range of subjects relating to research and testing of engineering materials will be discussed at the 58th Annual Meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-July 1, 1955. A total of 30 sessions are now scheduled beginning on Monday morning and continuing until Friday noon. Six symposiums are scheduled on the following subjects: impact, judgment factors in soils testing, significance of tests of concrete, high purity water corrosion, speed of testing, and metallic materials for service above 1600° F. In addition, sessions are scheduled at which individual papers will be given on the subjects of soils, nonferrous metals, steel, testing of materials, and fatigue.

Important on each year's program are two lectures, the Edgar Marburg Lecture

625,000 Amps!

FOR THE WORLD'S LARGEST PLATING PLANT



One of 5 generator rooms

SUPPLIED BY 48

Chandeysson

ELECTROLYTIC GENERATORS

Plating at the rate of one bumper every three seconds . . . 19,200 per day . . . allows little time for interruption. To assure a dependable, high-efficiency power supply for this mammoth, automatic plating plant, 48 brute-size Chandeysson motor generators were chosen.

Chandeysson generators were specified exclusively for this multimillion-dollar installation because of their outstanding reputation for trouble-free operation, low maintenance and high overall efficiency . . . and, for their ability to withstand repeated heavy overloads without damage of any sort.

YOU SAVE 4 WAYS...

USE LESS POWER . . . precision-built for efficiency and built-in voltage regulation.

GET MORE OUT OF THE POWER YOU PAY FOR . . . built-in high power factor at no extra cost.

BE SURE OF POWER WHEN YOU NEED IT MOST . . . Chandeysson users report capacity in excess of published statements of 150% momentary and 125% sustained loads, without distress or damage.

ENJOY LIFETIME POWER DIVIDENDS . . . sustained, lifetime overall constant efficiency as high as 85% does not decrease with age or overload.

62

CHANDEYSSON ELECTRIC COMPANY • 4074 Bingham Ave • St. Louis 16, Missouri

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Cover Story

OPEN WIDE THE DOORS . . .

Here is the keyhole. The reader has the key. Insert it and he will open the door to a new world. There, in the Cleveland we see through the keyhole, will be assembled our industries' greatest show of the year. There any interested person can walk through a wonderland of machines, equipment, chemicals, people, services, education. There—just by going through the door—lies a genuine wonderland that just a few short years ago might have been labeled "a dreamer's fantasy."

And now the time has come when the promises of the years are brought together in one place. And even as you look and touch and talk not half a block away other men will meet to talk of another even more fantastic world of tomorrow.

When this door opens (in less than a month!) the finishing industries will lay open their hearts. They will offer ingenuity, ideas, methods, systems, tools, materials and services that, taken together spells: PROFIT.

So take your key and swing wide the light green door that gives promise of immensely greener fields beyond.

SEE YOU IN CLEVELAND in June.

NEW ENGLAND MEETING

Come to the New England AES Regional Meeting at the Statler, Hartford, Conn., on Saturday, May 14.

Excellent educational session, banquet and good fellowship.

Intersociety News

and the Gillett Memorial Lecture. The Marburg Lecture this year will be given by Dr. Walter J. Hamburger, Director, Fabric Research Laboratory, Inc., Boston, Mass., on the subject of textile fibers. Dr. Fritz V. Lenel, Renssalaer Polytechnic Institute, will give the Gillett Memorial Lecture on metal powders.

Important in the Society's activities are the large number of technical committee meetings which are scheduled. Forty-five committees and their subcommittees will hold a total of about 450 meetings.

On Wednesday evening, June 29, the annual dinner will provide a "break" in a week otherwise devoted to intensive technical activity. Entertainment will include a floor show and dancing.

ASM Metalworking Machinery and Equipment Exposition

The Metalworking Machinery and Equipment Exposition will be held September 6 through 16 in the Chicago Coliseum. Running concurrently with it will be the machine tool show and the Navy Pier equipment show.

More than 70 per cent of the available floor space has already been sold. With some 8,400 square feet unsold out of a total of more than 40,000, the American Society for Metals looks for a capacity show which includes at the moment, practically every type of production and metalworking machinery available today, along with specialty machines and a wide assortment of equipment items.

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If you are going to move, it is necessary that the proper notification be made, at the earliest possible moment, so that you may continue to receive your copies of PLATING without interruption.

Such notification should be made to headquarters by letter, post card, or post-office form No. 22S, giving the old address as well as the new, with postal-zone number if any. You should also notify your local post office on postal form No. 22 of your change of address. Both postal forms are obtainable at any post office.

As considerable time is required to process a change of address, you are urged to advise the PLATING Circulation Department as soon as you know your new address, preferably three weeks in advance of moving.

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Personals

John M. Maitland has been named manager of the Detroit District Office of The Bristol Company, Waterbury, Conn., according to a recent statement by **H. E. Beane,** vice-president (sales).

Maitland

Maitland attended the University of Michigan, and the Michigan College of Mining and Agriculture, receiving his B.S. degree in chemical engineering from the latter school.

After a brief period with the North Range Mining Co., he went to the Grasselli Chemicals Division of E. I. duPont, where he remained until 1944. In that year, he joined the Bristol sales staff at the company's Cleveland office, moving to Schenectady in 1946. In 1953, he was transferred to the New York office, where he has been located until his recent promotion.

Maitland has been active in instrument organizations, as president of the New York Section of the Instrument Society of America, and past president of the Eastern New York Section ISA. He is also a past vice-president of the New York State Junior Chamber of Commerce.

Richard A. Mixer, corrosion engineer in the MW Protective Coatings Division of Metalweld, Inc., was recently advanced to the position of manager of that division.

Mixer

Before coming to Metalweld, Mixer was associated with the Plastics Division of a large Philadelphia chemical firm.

He attended the University of Michigan where he received his BS in chemical engineering and his master's degree in business administration. He is a member of the NACE.

Philadelphia Quartz Company, Philadelphia, Pa., manufacturers of soluble silicates, has announced the election of additional officers—three vice-presidents, **John C. Russell,** sales; **Charles E. Ramsey,** traffic, and **Thomas Elkinton,** executive and personnel; and an assistant treasurer, **J. Morris Evans.**

The company also has appointed **Le Roy R. Fischer** as sales manager and **T. Marvin Hennessy** as traffic manager.

Paul M. Barnes has been named export sales supervisor of Acheson Colloids Company, Port Huron, Mich., according to **M. W. Reynolds,** general manager. Barnes comes to this newly created post with a background of experience in international commerce. Following matriculation at New Mexico A & M, Barnes studied at the American Institute for Foreign Trade. Previous to joining Acheson earlier this year, he was assistant sales manager of Union Starch and Refining Company's Export Division.

Barnes

Appointment of **Martin F. Wilkerson** as manager of the Houston, Texas branch sales office of Diamond Alkali Company was announced by **W. H. McConnell,** vice-president (sales).

Wilkerson succeeds **John W. Kennady,** who was made general manager of the Diamond Black Leaf Company, Richmond, Va. The firm was organized jointly by Diamond Alkali Company and Virginia-Carolina Chemical Corporation to take over the manufacture and merchandising of the Black Leaf brand of agricultural chemicals and pest control products.

Wilkerson comes to his new post from Memphis, Tenn., where he has been a member of Diamond's sales staff since June 1948.

A native of Tennessee, born in Lenoir City, Wilkerson graduated from the University of Tennessee, Knoxville, with a B.S. degree in business administration majoring in industrial engineering.

A World War II veteran, he saw service in the European theater with the U. S. Army Corps of Engineers.

With his wife and two-year-old son, he is now moving to Houston.

H. T. Sulcer, vice-president and general manager of Graver Water Conditioning Co., New York, has announced the appointment of Frontier Engineering Services Co., Salt Lake City, Utah, as new representatives. Their territory consists of the northern and western parts of Wyoming, most of Nevada and all of Utah.

W. R. Olsen and **W. R. Fresne** of Frontier Engineering Services Co. are both well versed in power plant and water conditioning work and will be an important addition to Graver's increasing sales organization.

United Chromium Limited, Canadian affiliate of United Chromium, Inc., has announced that **R. W. Stephens** has joined them as a sales and service engineer. He will serve the Canadian metal finishing industry with the complete line of Unichrome plating processes, materials, equipment, organic coatings, and Ucilon Protective Coatings.

Stephens

Stephens has long been associated with electroplating. His career started with the Appliance Division of Canadian General Electric Co. in 1935. From 1945 through 1947 he was with Coro of Canada Limited. He later served several years with Brydon Brass Manufacturing Company in the marine hardware field. From 1950 until he joined United Chromium Limited, Stephens was a sales and service engineer for F. B. Stevens.

Alden Crankshaw, sales manager of Acheson Colloids Company, Port Huron, Mich., has announced the appointment of **Wallace J. Keith** as sales engineer to open the company's second Ohio sales office. The new office will be located in Dayton.

Keith

Keith will provide technical service to Acheson customers located in western and southern Ohio, as well as most of Indiana and Kentucky. Customers in northern and eastern Ohio will continue to be served by the Cleveland office of Acheson Colloids, managed by **Richard G. Hartnett.**

Keith came to Acheson after four years with the Ford Motor Company, where his major responsibilities were in the field of cost analysis and control. Before that, he worked for the Murray Corporation of America. He was graduated from Northwestern University in 1947 with a B.S. degree, and attended Wayne University where he studied investments and budgetary controls. From 1943 to 1946 he served in the U. S. Air Force with duties in India and China. Keith is a member of the Young Republicans Club, Detroit.

Personals

Simon D. Strauss, vice-president and sales manager of American Smelting and Refining Company, N. Y., has announced the appointment of **Ralph W. Bailey** as sales manager of the Continuous-Cast Products Department.

Bailey

Bailey comes to the Perth Amboy, N. J., headquarters of Continuous-Cast Products after ten years of sales experience with Asarco, five of which were spent as district sales manager in Whiting, Ind. He replaces **John L. Kimberley** who has moved on to the American Zinc Institute in an executive capacity.

A graduate of Yale University with a B.S. in metallurgy (1934) and an M.E. in metallurgy (1936), Bailey holds Tau Beta Pi and Sigma Xi keys and is a member of the Yale Engineering Association. His first position after graduation was with Scovill Mfg. Co., as metallurgist. This was followed by two years with United Aircraft Products, also as metallurgist.

Heil Process Equipment Corporation, Cleveland, has announced the appointment of Robert Scheel to head up their Chicago office.

Scheel

A sales engineer, Scheel is a graduate of Ohio University and formerly was associated with the Elyria, Ohio, plant of Bendix-Westinghouse before joining Heil as an estimator, and later as sales engineer, where he acquired extensive sales and field engineering experience. He is a member of the AES. At his new post he will represent Heil's complete line of chemical and corrosion-proof equipment which services the needs of the steel, plating and chemical industries with such products as tank linings, lead anodes, fume scrubbers, steam jet agitators, heat exchangers, solid plastic hood and duct systems, and acid-proof maintenance materials.

E. L. Newhouse, Jr., vice-president of the American Smelting and Refining Company, has announced that, effective May 1, 1955, **Leo Halpern** is resigning as Pacific Coast manager of the Federated Metals Division. Halpern will be replaced by **Frederick Farnow,** who is at present manager of the San Francisco plant of Federated Metals Division.

John L. McLaughlin has joined Allied Porcenell, Inc., of Phoenix, Ariz. and Waukegan, Ill., according to a statement by **William Stoll,** company president. He has been appointed to the position of assistant to the president and will be in charge of the sales and service departments for the company's new family of low temperature protective and decorative silicate coatings.

Dr. Randolph T. Major, scientific vice-president of Merck & Co., Inc., has been elected a director-at-large of the American Chemical Society, according to an announcement by **Dr. Ernest H. Volwiler,** chairman of the society's board of directors.

Fred W. Wagner, sales manager, Wagner Brothers Inc., has appointed **Thomas Kohler** as sales and service representative for the Detroit area.

Kohler

Kohler was formerly manager of the Filter Division at Wagner Bothers. Prior to that, he had widely diversified experience in the electroplating field, serving as plating superintendent for several manufacturing concerns. He is a graduate of St. Lawrence University, Canton, N. Y.

Wagner Brothers, Inc., manufacture products for the metal finishing industry such as full automatic plating systems, semi-automatic platers, rectifiers, liquid filters, waste treatment systems, tanks and linings, anodes, solutions and supplies.

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Personals

John Poor, director of research and development for the Van der Horst Corporation, Olean, N. Y., announces the appointment of **Dr. Hyman Chessin** as assistant director of research and development.

Chessin

Dr. Chessin received his doctorate in physical and electrochemistry at Western Reserve University in Cleveland. Prior to joining the Van der Horst Corporation, Dr. Chessin taught at Kenyon College and conducted research at the University of Arkansas.

In his new position, Dr. Chessin will assist in research for product improvement and development, in addition to conducting research into broader applications for the corporation's Porus-Krome and Vanderloy electroplating processes.

American Society for Metals, largest engineering society in the nation, has announced the appointment to the newly created post of Director of Educational Activities **Dr. Anton deSales Brasunas,** associate professor of metallurgical engineering at the University of Tennessee.

William H. Eisenman, secretary of the society, made the announcement in a statement pointing up the society's broad five-point progress program. Feature of this program is the society's recently created Metals Engineering Institute, which encompasses a series of more than forty metals engineering courses.

Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturer of electroplating and polishing equipment and supplies, announces the appointment of **Glenn M. Herring** as manager of steel mill sales.

Herring

The company also announces the concurrent appointments of **William H. Brown** as sales representative at Philadelphia for eastern Pennsylvania, and **Frank W. Mountain** as sales representative at Pittsburgh for western Pennsylvania, West Virginia and Alabama.

Herring has been associated with major steel mills and steel mill suppliers for 25 years, serving as an H-VW-M representative in the Pittsburgh area. He now moves to the company's home office in Matawan.

Mountain

A specialist in continuous cleaning and plating operations, Herring has also had extensive experience in the motor-generator and rectifier field. He will represent H-VW-M's interests in steel mills throughout the country.

A graduate of Lafayette College, Herring joined H-VW-M in 1930 as a salesman. His first assignment was in the Pittsburgh area, and he has served there since with time out for military service. During World War II, he was a major in the U. S. Air Force.

Mountain takes over Herring's former territory. He moves from H-VW-M's Philadelphia office, where he was covering the territory of eastern Pennsylvania. A graduate of Colgate University, class of 1950, Mountain is a company-trained sales representative, having worked for a year in the H-VW-M laboratory before going into the field.

Brown

Brown takes over Mountain's territory in eastern Pennsylvania. He moves to the Philadelphia office from Matawan where he was working as a sales engineer. Following World War II, Brown was associated with the Beydel Chemical Co. as a technical sales representative, and research and development engineer. He subsequently worked as a safety director with the Signal Corps Engineering Laboratory at Fort Monmouth, N. J.

A veteran of World War II, Brown attended Columbia University where he studied chemical engineering, and Rutgers where he undertook courses in sanitary engineering. He is a member of the AES.

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Seymour "NC" and "CK" Bright Nickel processes in a warm plating bath permits specification barrel nickel plating to any desired deposit from .0002" to .0010" at speeds four to six times faster than a cold solution.

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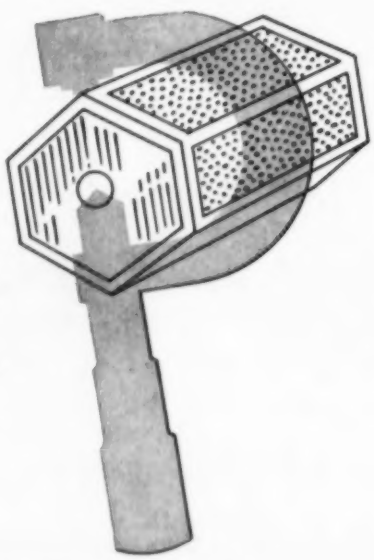
Simple to maintain and easy to control, Seymour brighteners permit chromium plating without prior buffing or wiping.



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Placing phonograph motor boards in copper plating bath. Plated parts on right are allowed to drain to reduce drag-out.

"Du Pont Coppralyte® gives the speed and throwing power we need for heavy copper deposits"

—Says Edwin McFarland, Supt., Kelly Plating Co.

Plated hubs being removed from rack. Bore is unplated and will be carburized.

"Baths made up with 'Coppralyte' plating salt are economical, too," Mr. McFarland continues. "And they're easy to make up and maintain with the prepared salts. That's why they've been our choice for over 8 years."

At its Cleveland plant, Kelly Plating Co. plates 3,000 bicycle hubs and 3,000 phonograph motor boards per eight-hour shift. The heavy copper coating on the hubs serves as an undercoating for subsequent nickel and chrome plating. A lighter deposit on the motor boards prevents rusting and forms a base for attractive finishes.

Kelly Plating's trouble-free experience can be yours too—whatever your particular copper plating needs may be. You'll find that Du Pont cyanide copper plating chemicals can meet all your requirements for high-quality results and economical operation.

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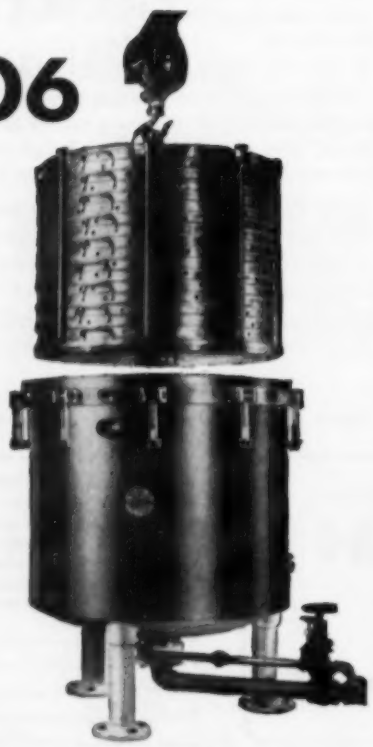

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Personals

Three new men were elected to the board of directors of American Wheelabrator & Equipment Corp., Mishawaka, Ind., at the recent annual stockholders meeting. Among them was **Leslie L. Andrus,** vice-president of the corporation and executive head of its Dust & Fume Control Division. The division headed by Andrus is known in many industries for work toward prevention of atmospheric pollution. The corporation manufactures Wheelabrator Dustube dust and fume collectors.

Andrus

Harold M. Miller, vice-president of the corporation since 1944, and a member of the firm since 1923, was also elected director. The third director elected was **Ray P. Whitman,** first vice-president of Bell Aircraft Corp., Buffalo, N. Y.

Utica Drop Forge & Fuel Corporation has announced the appointment of **Frank L. Marshall** as sales manager of the Tool Division. He will be calling on Utica distributors extensively, helping with sales problems and analysis.

Marshall

Marshall was formerly vice-president and general manager of Mayhew Steel Products, Inc., Shelburne Falls, Mass. He had been with Mayhew since 1939. During World War II Marshall was a Captain in the Army Air Force. He is a member of the American Marketing Association, Sales Executives Club, the Elks and the Eagles.

Grohs

Gilbert Tramer, president of the Gilbert Tramer Co., Cleveland, Ohio, announces the appointment of **Edward M. Grohs** as assistant sales manager. Grohs has had many years of sales, service and purchasing experience with various companies. He was graduated from Western Reserve University in 1926, LL.B. 1928. He served as major in the U. S. Army during four years of World War II.

Personals

Appointment of **John F. Tyrrell** as senior associate editor for Metal Progress, leading source of authoritative information in the metals industry, has been announced by **Ernest E. Thum**, editor of the publication.

Tyrrell

For the past four years Tyrrell has been an advertising representative for Metal Progress, covering the Eastern Seaboard states and Western Pennsylvania.

Well grounded in metallurgy, Tyrrell is a graduate of Massachusetts Institute of Technology (1943), and holds a bachelor's degree in his field.

Following his graduation from MIT, Tyrrell spent a year and a half with the Allegheny-Ludlum Steel Corporation, working on mill problems associated with the service behavior of stainless and heat resisting alloys.

During World War II Tyrrell served with the Navy as an underwater demolition expert, with additional service at the end of hostilities as an officer aboard various types of landing craft.

For five years following his release from service, he worked with Solar Aircraft Company, San Diego as a metallurgist. His primary function was the solution of problems associated with fabrication of aircraft and jet engine alloys. Tyrrell also helped in the selection of many of the new alloys used in small gas turbines that Solar was developing at that time.

Now 33, Tyrrell is married and the father of four daughters. He will move his home from New York City to Cleveland, editorial office for Metal Progress and headquarters for the ASM which publishes the magazine.

Philip P. Bruno and **Stanley Chait** have together formed MACARR, Inc. This company will serve the metal finishing in-

Chait

Bruno

dustry by the introduction of many advanced concepts in "automation." Their principal product is "Automation

Cut anode costs more than ½!

For a given length of anode rod you may, for example, buy three 22-inch, 3-rib conventional extruded lead anodes. *Price would probably be about $5.60 each. Total: $16.80. These anodes would last you about 9 months in normal service. Cost per month: $1.87.

For the same length of anode rod you would need two 22-inch Conducta-Core anodes at about $17.50 each. *Total: $35.00. BUT the Conducta-Core anodes will last you 3½ years! Cost per month: $.83!

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**These prices are approximate. They vary with market conditions but since both are dependent upon the price of the base metals of which they are made, the relation between them remains much the same.*

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Personals

Engineering" for existing d-c power equipment such as rectifiers and generators.

Philip P. Bruno served the Western Electric Co. and Bell Laboratories for five years prior to joining the Rapid Electric Co. in 1947. With this latter firm he held responsible positions in sales, management and engineering until January 1955 when he resigned to form the newly announced company. He is a popular and active member of the New York branch of the AES, and served as Outing Chairman in last year's N. Y. AES Convention.

Stanley Chait received his B.S. at New York University and obtained his M.A. at Columbia University. He has done extension work in the fields of radar and navigational aids. Has been associated with various consulting engineering firms like Taag, Designs., Ammann & Whitney, recently with Rapid Electric Co. as design and project engineer. His education, ability and experience combined with his great interest in the metal finishing industry has resulted in many new automation developments one of which is currently under patent application. Many more good things for the industry to come from his new association with Philip P. Bruno and Macarr, Inc.

O. A. Pfaff, president and general manager of American Wheelabrator & Equipment Corp., Mishawaka, Ind., was elected to the board of Directors of Bell Aircraft Corp., Buffalo, N. Y., at the recent meeting of Bell stockholders.

Pfaff

Forty-two sales engineers were recently added to the field sales force of Minneapolis-Honeywell Regulator Company's Industrial Division in 25 branch offices located in 23 U. S. cities and 2 Canadian cities, it was announced by **J. A. Robinson,** field sales manager.

Robinson said that the appointment of the new sales engineers—all graduates of the division's training school in Philadelphia—was in line with the firm's planned growth program designed to meet the increased complexities of marketing in the automation field. He pointed out that despite the fact that 250,000 manufacturing firms use industrial instruments—100,000 plants having installed automatic control equipment since 1940—industry as a whole has probably realized only 10 to 15 per cent of the full potential of automatic control.

At the same time Robinson reported that 18 service engineers were also added to the firm's field sales force, taking positions in 12 U. S. cities and 1 Canadian.

The new appointees include: **William N. Wallace, Stig G. Gavelin** and **Richard P. Ash,** San Francisco; **Jack Phillips** and **John M. Robinson,** Los Angeles; **Joseph H. Mitchell, John M. Kennedy** and **Ronald L. Anderson,** Houston; **Henry R. Rivitz, William E. Ware** and **Henry T. Vaders,** Philadelphia; **Walter W. Johnson,** Columbus; **Frank A. Patterson, James R. Alexander, Owen N. Smith** and **Kingsley G. Drake,** Montreal; **Reuben E. Hopkins,** Peoria; **William D. Robertson, Louis H. Johnson** and **Joseph T. England,** Union; **Raymond S. Johnston,** Dayton; **John P. McSweeney,** Cleveland, and **Herbert D. Couture,** Charlotte.

Also, **Robert L. Muha** and **Tom J. Chakos,** Chicago; **Francis J. Deinzer,** Buffalo; **Bruce M. Harman,** Baltimore; **Robert H. Schaffer,** Detroit; **Clarence L. Ledin,** Boston; **James B. Harper, Clifford R. Hawker, Ralph Parker** and **Walter Harasym,** Toronto; **Delos P. Young,** Portland, Ore.; **Eldred E. Jones,** Wichita; **Gordon D. Fourman,** Knoxville; **Richard T. Flanagan** and **Edward J. Herold,** New York; **James W. Lovill,** Cincinnati; **Earl J. Finear,** Dallas; **Raymond J. Miotke,** Milwaukee, and **Alvin E. Smith,** Seattle.

Reginald Robinson has been assigned to represent the chemical sales division of Chas. Pfizer & Co., Inc., in the San Francisco area, **Frank F. Black** sales manager, announced.

Robinson succeeds **Edward A. Poleselli,** who is being transferred to the headquarters of the Pfizer International Subsidiaries, New York.

A resident of El Cerrito, Calif., Robinson has been with the University of Calif. Radiation Laboratory. He was previously associated with the Union of Richfield Oil company in an engineering capacity.

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M&T bronze can be controlled as readily as single metallic salt baths—has excellent throwing power plus a wide bright plate range that minimizes burning and missing . . . plating speed is up to 50% faster than with other bright baths. Make-up and replenishment costs are low.
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Personals

He was graduated from Princeton University in 1945 with a degree in chemical engineering.

Jack Hanney, a former president of the Grand Rapids Branch of the AES, was recently honored by his co-workers at United Chromium. The occasion was Hanney's 10th anniversary as a sales and service engineer with the company. A luncheon, attended by all members of the Ten and Twenty Year Service Clubs working out of the Detroit office of United Chromium, was held at the Fox and Hounds Restaurant. Those in attendance represented more than 300 years experience in servicing the metal finishing industry.

Hanney has long been an active participant in affairs pertaining to the AES A regular attendant of AES Conventions, Jack is as well known in other parts of the country as in Michigan where he has served the industry so well.

Appointment of **Archie K. Beard** as manager of the Metal Processing Division and Eastern Divisional manager of the new Chem-Mill Division has been announced by **Pres. S. G. Thornbury**, Turco Products, Inc., Los Angeles manufacturer of specialized chemical processing compounds. Beard will headquarter at Turco's eastern plant in Newark, N. J.

In his position as manager of Turco's Metal Processing Division, Beard will be in charge of national sales to all heavy industry, other than to transportation accounts. As Eastern manager of Turco's Chem-Mill Division, he will introduce the new method of contouring metal by chemical means to industrial firms throughout the eastern United States.

Beard joined Turco shortly after World War II as a process engineer and worked his way up through Turco's sales department. In 1948, he was appointed district manager of Turco's newly created Cleveland Sales District, and three years later became head of the consolidated Cleveland-Chicago Midwest Sales Division. For the past two years, he has been Air Force divisional manager.

A native of Arizona, Beard received his B.S. in Chemistry from Arizona State College (Flagstaff) and his M.S. from the University of Southern California. Prior to joining Turco, he was chief chemist of the Goodyear Aircraft Company, Phoenix Division, and a chemist with the Phelps-Dodge Corporation at Clarksdale, Arizona.

John Mordica and **Gene C. Edwards**, veteran members of the Gilron Products Company sales staff, will continue to service their respective accounts following consolidation of their organization with the Pennsylvania Salt Manufacturing Company.

As previously announced, the assets of Gilron Products have been acquired by Pennsalt Chemicals and its organization is being integrated with the parent company's Metal Processing Department. Distribution of Gilron Products which feature Drawcote—a dry, soak-type drawing compound—and include a line of metal cleaners, will continue on an expanded scale. These products add logical diversification to Pennsalt's well-known Foscoat and Fosbond systems.

Mordica joined the Gilron organization in 1945 after nine years service on the sales staff of the Firth Steel Company. Prior to that assignment he was associated with the Wire Division of Bethlehem Steel. He received his technical education at the University of Maryland.

Also a veteran in the metal processing field, Edwards served successively as plating supervisor for the Standard Steel Spring Company, and superintendent of the plating department of the Chrysler Corporation. Before he became a member of the Gilron sales organization six years ago, he represented the Frederick B. Stevens Company in Cleveland.

"LAZO" 2CP6

Lucite Portable Plating Barrel

- LIGHT WEIGHT (TOTAL, 19 POUNDS).
- POSITIVE CATHODE CONTACT.
- MULTI-MESH DRIVE. GEARING SPECIFICALLY ENGINEERED TO EXTEND GEAR LIFE AND MAKE OPERATION SMOOTHER.
- ADAPTABLE TO ALL PLATING TANKS OR SOLUTIONS WITHOUT NEED FOR SPECIAL EQUIPMENT.
- DIMENSIONS: 6" x 12" I.D. CAPACITY: 2 QUARTS (APPROXIMATELY). LOAD: 5 to 15 POUNDS.
- 3/32" PERFORATIONS.

$178.00

PLATING LAZO EQUIPMENT

HARDWOOD LINE MFG. CO.

Lucite Cylinders For Complete Cycle Plating

UNEXCELLED SERVICE

2022 N. California Ave. – Chicago 47, Illinois – Dickens 2-9393

Originators of Ribless Plating Barrels

362 COMPANIES USE

Sel-Rex Bright Gold Process

Automotive

More and more manufacturers have recognized the need for adding "sales appeal" to their products and they found the answer with the Sel-Rex BRIGHT GOLD PROCESS . . . without increasing their manufacturing cost!

Here is the only Bright Gold Process that offers unlimited use — both decorative as well as functional. It produces a rich, mirror-bright surface that is hard and corrosion resistant without scratch brushing or buffing. Sel-Rex BRIGHT GOLD PROCESS requires no special equipment and operates at room temperatures.

Let us demonstrate how the Sel-Rex BRIGHT GOLD PROCESS can improve your product . . . help create greater sales appeal — at lower cost. Try a trial order or write for complete data to meet your particular specifications.

Pens and Pencils

Household Appliances

Accessories

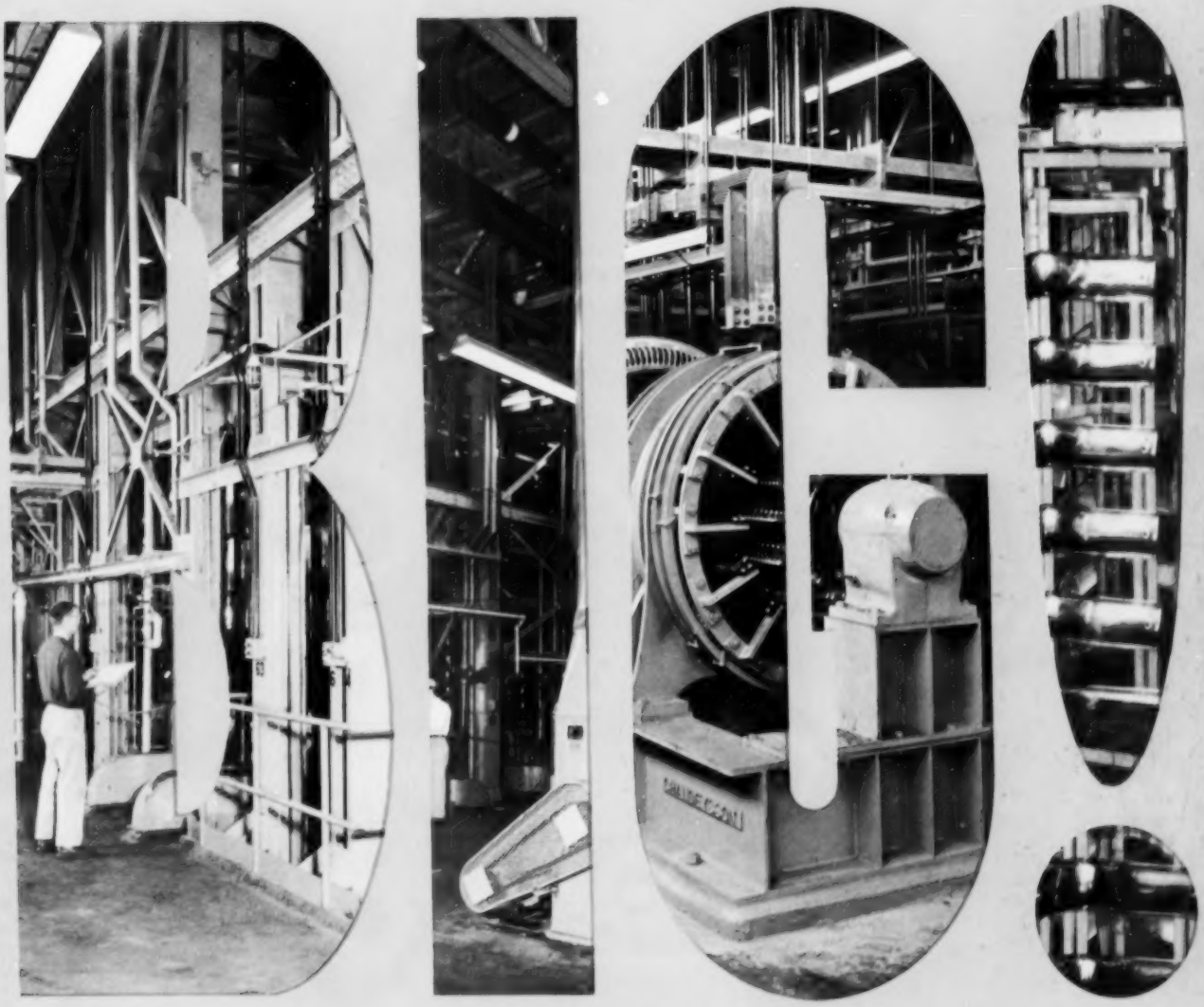
Watches and Jewelry

Sel-Rex Precious Metals, Inc.

229 MAIN STREET BELLEVILLE 9, NEW JERSEY

Manufacturers of Sel-Rex Silver Sel-U-Salt and Bright Rhodium

WORLD'S *Largest* PLATING PLANT!



1 BUMPER *Every 3 Seconds—*

19,200 *Every Day!*

ENGINEERED AND INSTALLED BY THE GEORGE L. NANKERVIS COMPANY

DETROIT, MICHIGAN

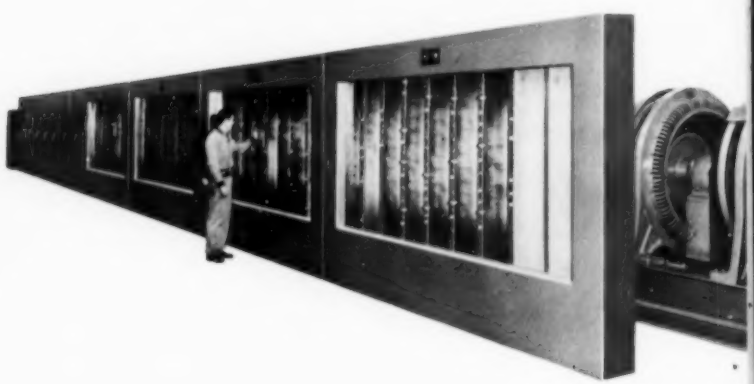
WORLD'S *Largest*

THE NANKERVIS STORY

Shortly after the first of the year, the world's largest plating plant began full-scale operation. Built for a large automobile manufacturer, this one plating plant produces all of the bumpers for their entire production.

Engineering and installation of the entire project was done by the George L. Nankervis Company, including the procurement of all the equipment required. This tremendous assignment was accomplished on a team basis by groups of top-flight Nankervis engineers, each specializing in a separate phase of the job; electrical, chemical, mechanical, civil, process piping, structural and others.

Here is the dramatic story of that installation . . . an on-the-scene look into the world's largest plating plant.



HERE'S HOW *Big* IT IS!

- ★ Produces over four acres of plated surface every 16 hours—*plates 1200 automobile bumpers per hour!*
- ★ Covers 180,000 square feet . . . the equal of three football fields.
- ★ Steel used in machine fabrication would equal that used in a 38-story office building with an area of 10,000 square feet per floor.
- ★ 906,000-gallon plating and storage tank capacity—enough to fill 109 tank cars.
- ★ Power used would illuminate 20,000 homes.
- ★ Almost ½ of a mile of plating machines.
- ★ More than a half-million pounds of copper buss bar used.
- ★ 30 huge blowers supply ventilation—979,500 cubic feet per minute.
- ★ 710 miles of wire used in the installation of the automatic control panels and checking circuits.
- ★ Filtering rate—over 7000 gallons per minute.

COMPLETELY AUTOMATIC

Obviously a job of this size must feature complete automation. Pressing one button starts the machines and from then on it's completely automatic. Operators are required only to load and unload the bumpers.

A unique electro-graphic detector system—large illuminated panels showing the complete electrical system in schematic diagram—is used for maintenance purposes. Each point on these schematics is actually wired to its counterpart on the machine so that if trouble develops it can be spotted easily and quickly.

ENGINEERED AND INSTALLED BY

PLATING MACHINES BY MEAKER CO.

PLATING PLANT!

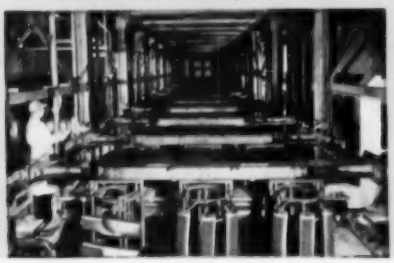
THE OPERATION

The flow chart at the right illustrates the plating cycle. Bumpers enter the copper-nickel section of the machine. Here they are conveyed through 21 different pre-cleaning, plating and rinsing operations. Under rigid quality control measures, each bumper is given a generous undercoating of copper and nickel plate.

Next, the bumpers leave the plating machine and are conveyed to the first floor for buffing. Returning automatically to the chromium section—they are sent through 10 additional processes—including the chrome plate which produces the lusterous super finish. They now leave the plating area on conveyors for delivery to the Shipping Department.

MACHINES BY MEAKER

Second Deck of Machine, Rack Return



First Deck of Machine, Racks Loaded

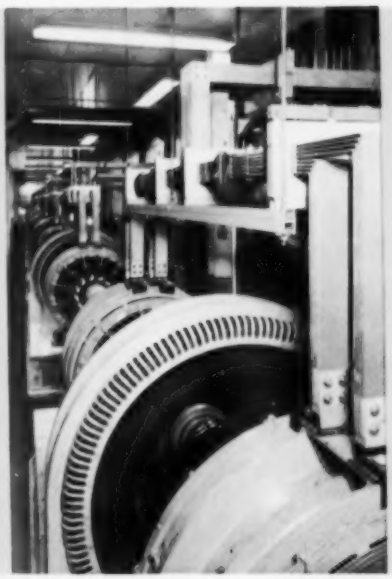
The Meaker Company designed and built the plating machines. Custom-designed for this job, they are selective, batch type machines which are unique in operation. Instead of the racks of bumpers parading through the machine, "follow-the-leader" style, the racks actually pass each other, "leap frog" style, automatically selecting the proper empty plating cell. Batch type operation permitted the use of conforming anodes which give uniform plating to curved surfaces.

Heavy duty construction was used throughout to assure uninterrupted operation at high speeds and 'round the clock duty. And of equal importance—all operating parts of the machine are easily accessible for inspection and maintenance. No "hard-to-get-at" places on these giants.

THE MEAKER COMPANY

Chicago Illinois

POWER BY CHANDEYSSON



48 Chandeysson generators—625,000 amps.

625,000 AMPERES of low voltage current required for this giant plating operation are provided by 48 Chandeysson Generators. These brute-size generators range in sizes from 7500 to 20,000 amperes.

To maintain continuous production from this gigantic automatic plating machine, a dependable power supply is essential. Chandeysson generators were chosen for their reputation of high efficiency with minimum maintenance and for their ability to absorb substantial and frequent overloads without damage.

For half a century, Chandeysson has been a major source of motor-generators to the automotive industry—for 30 years supplying substantially all of the generators to this auto manufacturer—for a total of over 1,350,000 amperes.

Chandeysson GENERATORS

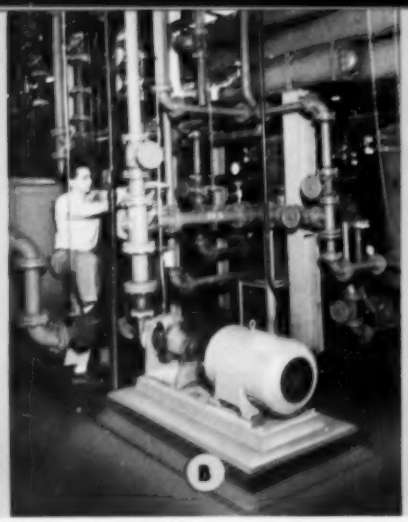
St. Louis Missouri

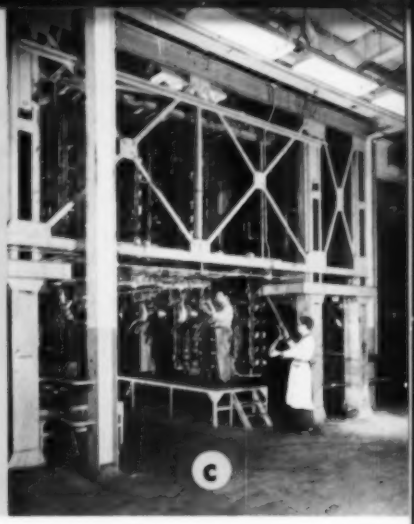
PLAN VIEW—*Plating Area*

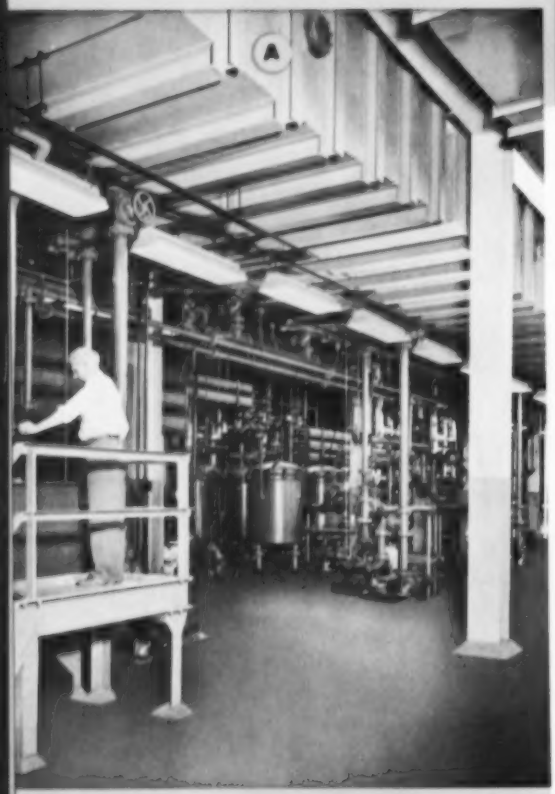
THE GEORGE L. NANKERVIS COMPANY

GENERATORS BY CHANDEYSSON ELECTRIC CO.

WORLD'S *Largest* PLATING PLANT







A TWO-FLOOR INSTALLATION: Unique installation of plating tanks—suspended through second floor—can be seen in the picture. This feature gives excellent accessibility to the plating machines above and the accessory equipment below.

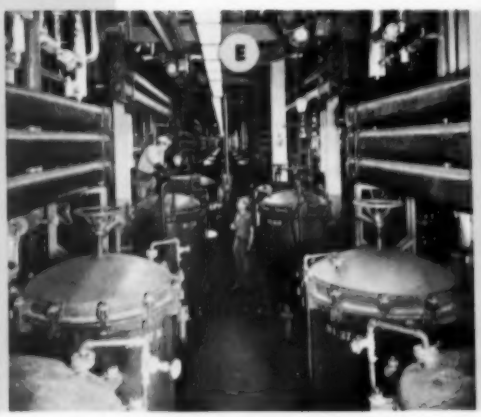
B CIRCULATION of the 430,500 gallons of copper, nickel and chrome solutions through filters and heat exchangers required an intricate process piping system—part of which is shown here.

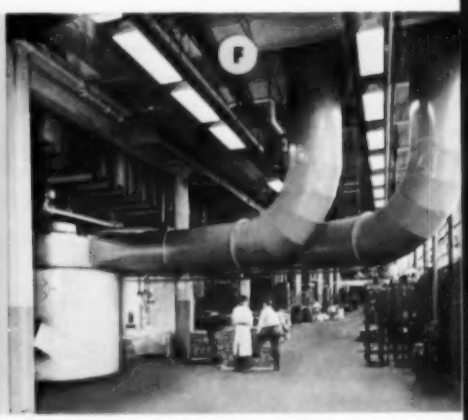
C UNLOADING: Bumpers are being unloaded on the first floor and placed on a conveyor for delivery to the Shipping Department.

D A BATTERY OF 3 MACHINES comprise the plating installation. Pictured here are the ends of the machines where the bumpers are lowered to the first floor for unloading.

E FILTRATION: 415,000 gallons of solution pass through these filters every hour—for purification—assuring good plating.

F VENTILATION of the system—at the rate of 979,500 cubic feet per minute—is accomplished with huge blowers.





Nankervis COMPANY

EQUIPMENT AND SUPPLIES
FOR THE METAL-FINISHING INDUSTRY

19255 W. DAVISON AVE. DETROIT 23, MICHIGAN

Personals

Metal & Thermit Corporation, New York, announces several changes in its sales organization due to retirements and promotions.

John B. Tinnon, vice-president and chief sales executive, who has been with Metal & Thermit since 1924, retires but will remain with the organization as a consultant. Tinnon, a former director and an honorary member of The American Welding Society, also has been active in The Manufacturing Chemists Association and The American Transit Association. He is widely acquainted in the welding, chemical and railway engineering fields. At present he is a member of the board of governors of The National Electrical Manufacturers Association.

Donald K. Morgan, formerly with the Kirby Machine Co., and a sales consulting engineer for several years, is promoted to general sales manager. Morgan has been chief assistant to Tinnon.

O. L. Howland, formerly manager of sales of the company's welding division is promoted to assistant to the general sales manager with headquarters in East Chicago, Ind. Howland for many years was district manager of the welding division in the middle-west and now returns as chief sales executive of the company in this area.

Merritt L. Smith, manager of advertising and sales promotion, assumes the additional duties of eastern assistant to the general sales manager, and will continue to make his headquarters at the company's main office in New York.

Robert T. Brown, former Metal & Thermit district manager in Pittsburgh, Pa., is promoted to the position of manager of sales of the welding division, with headquarters in New York.

Kenneth H. Zeigler, sales engineer with the company in the Pittsburgh area since 1951, has been promoted to the post of district manager at Pittsburgh.

On January 3, 1955, **William I. McGowan,** president of Chemical Products Corporation, Rhode Island, designated **Clinton M. Anderson,** sales manager of the Textile and Novelty Coatings Division of Chemical Products Corporation; **Gilbert C. Watson,** assistant sales manager of the Novelty Coating Division; **Joseph S. Hawes,** sales manager of the Cable Coating Division; and **Hugh B. Allison,** sales manager of the Chem-o-Sol Division of Chemical Products Corporation.

All of the divisions were previously under direct supervision of the president, but the growth of all divisions has been so substantial that it was deemed wise to break down sales classification into the departments as listed above; however, all sales department heads will report directly to McGowan.

Under the auspices of the Foreign Operations Administration and the U. S. Department of Labor's Bureau of Apprenticeship, **Dr. N. R. Kuloor** has joined Foster D. Snell, Inc., consulting chemists and engineers, as a trainee chemical engineer. Dr. Kuloor will be with Snell about four months in the Engineering Division where from practical on-the-job training, he will be able to learn chemical engineering design practices in the United States.

Dr. Kuloor is the recipient of an industrial training grant under the Point IV program of technical cooperation with other countries. He is on leave of absence from the Shri Ram Institute for Industrial Research in India where he worked for over seven years on the design and fabrication of pilot plants as chief chemical engineer. Dr. Kuloor matriculated with the D.I.C. and Ph.D. degrees from Imperial College, London University and the B.S. degree from St. Xavier's College, Bombay.

The Shri Ram Institute is a privately endowed foundation which provides assistance to industry on technical problems and performs applied research.

meet a famous cost cutter!

• Well known from coast to coast, Unichrome Coating 218X is identified by the flexible, thick, pore-free and chemical resistant protection it puts on racks in one coat . . . protection that has minimized rack maintenance costs for its users.

This green plastisol compound cures into a tough coating that doesn't chip, crack, lift at contacts, blister . . . that won't contaminate sensitive baths, that withstands all plating and cleaning solutions, even vapor degreasing cycles. Its premium quality is undisputed, its adhesion outstanding.

Remember . . . as a company that has developed plating processes, given service on plating problems, pioneered in plastisol coatings, United Chromium can deliver exactly what a rack coating needs for maximum service in your plant.

UNICHROME
Trade Mark

materials · processes · equipment

for better plating at less cost

UNITED CHROMIUM, INCORPORATED
A Metal & Thermit Organization

100 East 42nd Street, New York 17, N. Y.
Detroit 20, Mich. • Waterbury 20, Conn.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada: United Chromium Limited, Toronto 1, Ont.

Trade Literature

Please use Reader Service Card to obtain any item in this section

L—500. International Rack Co. Opens New Plating Rack Plant—The International Rack Co. has been established to serve the Ohio Valley with Naraco engineered racks, fixtures, and accessories for plating and materials handling. International Rack, newest in the coast-to-coast Naraco family was opened to meet a persistant demand by Ohio Valley Plating Executives.

Other Naraco companies are located in Paterson, Flint, Chicago, and Los Angeles. They have long been known as pioneer developers and producers of engineered handling systems; removable and replaceable work holders (which permit new tips or work holders to be screwed on when desired); stock reddy racks for anodizing or plating; and Naraco 300 Brown Plastisol Coatings which prevent damage, corrosion, and rejects.

L—501. How To Cut Masking Costs—A new 6-page illustrated bulletin giving many practical suggestions on how to save time and cut costs in spray painting and other metal finishing where masking is necessary is available from W. H. Brady Co., Milwaukee. The new folder describes in detail actual case histories with photographs of production and other applications using Brady Pre-Cut Protective Masks.

The applications shown include paint spraying, flow coating, dipping, brushing; anodizing and plating; machining; sandblasting and tumbling. Also sealing and protecting products, parts and assemblies during processing, handling, storage and shipment to keep them free from dirt dust, moisture, scratching.

Asking for Masking?

L—502. List of American Standards—The 1955 edition of American Standards has just been published. The 48-page publication lists and indexes about 1500 American Standards. There are 210 for construction and civil engineering, 153 mechanical, 272 electrical, 158 safety, 165 textiles and wearing apparel, 251 photography and motion pictures, 74 petroleum products, 69 chemical, 62 metallurgy, 38 gas-burning appliances, 32 drawings, letter symbols and abbreviations, 18 mining, 11 rubber, 10 office equipment and supplies, and a miscellany of others.

L—503. Sylvania Issues Molybdenum Brochure—A flow chart showing how molybdenum is manufactured and controlled quality-wise from oxide to finished product is featured in a new 20-page brochure issued by Sylvania Electric Products Inc.

The booklet's text provides information on molybdenum properties, processing, and product use, and includes a tabulation of Sylvania molybdenum products and their characteristics, physical properties of molybdenum wire and molybdenum tungsten (50–50) alloy. Also included are conversion factors to use in calculations and a full-page resistance-temperature nomograph chart.

L—504. Vapor Degreasing Process, Equipment—Now available from the Ramco Equipment Corp. is a new bulletin describing vapor degreasing, its advantages and the latest equipment available.

The bulletin illustrates when vapor degreasing may be used to free metal surfaces from grease, oil, resin, wax or lubricants—before electroplating, assembly, heat treating, inspection and testing, or enameling, painting, lacquering—or after stamping and drawing—or between machining operations.

L—505. On "Do-It-Yourself" of Corrosion-Proof Ventilating and Exhaust Systems—A comprehensive 8-page brochure, designed to aid companies in selecting and installing corrosion-proof polyethylene ventilating and exhaust systems, is now available from the American Agile Corporation, Bedford, Ohio.

The purpose of the free literature is to enable firms to adapt the do-it-yourself trend in installing such fabrications by using completely prefabricated components and fittings. One section illustrates and describes various possible complete installations, and explains how potential users may compute necessary materials plus the cost.

Transparent Storage

L—506. New and Different Catalog—An attractive new catalog has just been published by General Industrial Co. It features transparent plastic drawer "See-Thru" cabinets which are handy for storing all types of small parts. They are ideal for factory, office or display counter use. Also included are material handling equipment, lockers, storage cabinets, safety ladders, steel trucks and other items for industrial use, all of which are clearly illustrated and priced.

L—507. Platinum Clad Tungsten Wire—Baker and Co. of Newark, N. J., has made available a four-page bulletin on platinum clad tungsten wire for use in high power tube grids. The folio gives explanations on the reasons for the choice of tungsten as well as why platinum is used. Included are the results of studies which compare platinum clad tungsten with platinum clad molybdenum.

L—508. Booklet on CrysCoat Process of Iron Phosphating—The process by which iron phosphate coatings improve paint adherence and prevent corrosion on steel is lucidly explained and diagrammed in a new booklet recently published by Oakite Products, Inc.

The 12-page booklet is titled "How to Apply Iron Phosphate Coatings to Steel in Preparation for Painting." It discusses iron phosphate coatings used in the CrysCoat process and tells how the process cleans and phosphates at the same time; adds luster to the finish; protects against corrosion; saves paint and saves money.

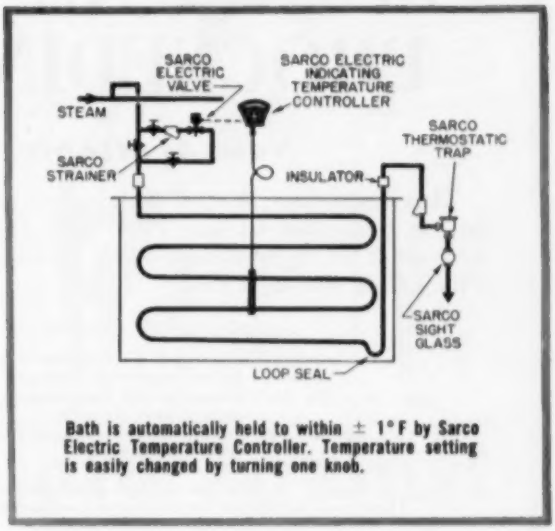
The booklet is well illustrated, with diagrams, drawings, and photographs taken in plants where the CrysCoat process is now being used successfully.

How control of tank temperatures

improves product quality—

cuts operating costs

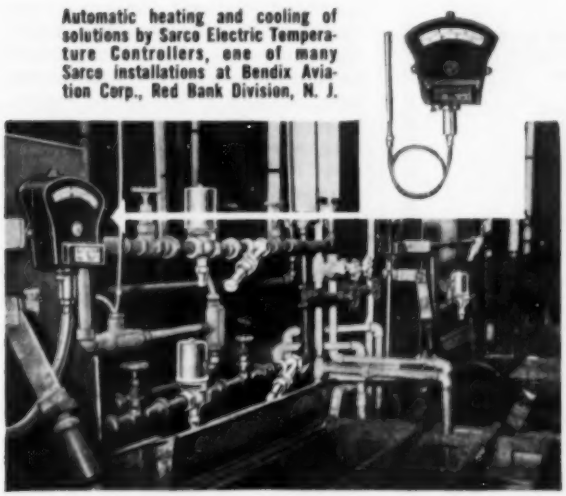
3 ways



Bath is automatically held to within ± 1°F by Sarco Electric Temperature Controller. Temperature setting is easily changed by turning one knob.

HERE'S HOW! Sarco electric temperature controllers soon pay for themselves by eliminating the inherent wastefulness of manual controls. Completely automatic operation saves plating materials, insures quality control by keeping temperatures where they belong at all times. Your tank-operating costs are cut three ways:

Automatic heating and cooling of solutions by Sarco Electric Temperature Controllers, one of many Sarco installations at Bendix Aviation Corp., Red Bank Division, N. J.



1. **You lower rejects** because solutions are held automatically to plus-minus 1°F. No chance for human error to mess up a tankload . . . and cut into profits.

2. **You save plating solutions** because automatic control prevents boil-off caused by creeping temperaure.

3. **You save steam** because you use only enough to keep bath at proper temperature.

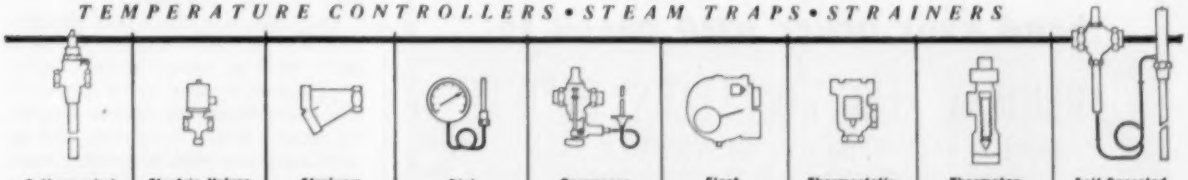
You can equip your tanks with a Sarco Electric Temperature Control System for as little as $130 a tank. Sarco controllers not only hold temperatures automatically but also indicate the temperatures being maintained and are easily adjustable for different jobs.

For complete information on the advantages of Sarco temperature controllers, write for Technical Bulletin No. 6. Sarco Company, Inc., Empire State Building, New York 1, N. Y. Representatives in principal cities.

SARCO

improves product quality and output

TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS



1954 AES ANNUAL PROCEEDINGS

Now Available

This handsome, bound volume contains technical papers presented at the 1954 AES convention held in New York as well as feature articles published in PLATING during 1954.

Included are the following:

Acceptance Sampling of Electroplated Articles
Active AES Committee Listings
AES Branches and Location
Annual Paper Awards
Anode Composition in Acid-Copper Plating
Ball Burnishing
Brass Plating
Cation Exchangers
Chromate Coatings for Zinc and Cadmium Plating
Chromium-Sulfate Complex
Copper and Copper-Base Alloys
Copper-Tin Alloy Plating
Corrosion Protection for Aircraft
Current Density Distribution
Electroless Nickel Plating
Equipment for Study of Electrodeposition on Oxide-Soiled Surfaces
Evaluations of Plated Coatings Through Electrochemistry
Free Cyanide and Zinc in Zinc Cyanide Solutions
Industrial Waste Control & Disposal
Instrument for Measuring Stress in Electrodeposits
Leveling in Cyanide Copper and Acid Copper Baths
Libraries which have AES Publications
Liquid Buffing Compositions
Listing of Honorary Members and AES Officers
Management Problems
Metalized Nonconductors
Metallurgical Hardness and Buffability
Nickel Plating, Troubles, Cures
Paint Strippers
Plating in the Television Field
Plating Rectifiers
Precision Barrel Finishing
Record of 41st Annual Convention
Report on AES Research Program
Servo Control, Wire and Strip Electropolishing
Stress Effect of Iron Contamination
Stress in Chromium Deposits
Throwing Power of Tin and Atin Alloy Solutions
Tin-Lead Alloy Deposits
Trace Constituents in Metal Finishing Effluents
Unplasticized Polyvinyl Chloride
Vacuum Metalizing
Zinc in Effluents

New and enlarged edition

$7.00 U. S. and Canada
$10.00 Foreign

Send your order with check to:

AMERICAN ELECTROPLATERS' SOCIETY
445 BROAD STREET, NEWARK 2, N. J.

Trade Literature

L—509. "Micro-Reflex" Hardness Tester—A new bulletin has recently been issued by Gries Industries, Inc., describing and illustrating the Wolpert-Gries "Micro-Reflex" hardness tester with optical system by Carl Zeiss, designed for loads from 10 gram to 3000 gram.

The bulletin outlines some of the many important applications of this high-precision apparatus, such as: hardness tests of hard layers below 0.1 mm (0.004 in) in thickness; very thin metal sheets and foils; small, highly stressed parts of watches and small driving gear; layers of metal plating; small precision tools, particularly at edges; and micro-constituents of the structure of metals and alloys.

L—510. Composite Catalog—Catalog 5002 is a new issue of the composite catalog which briefly and concisely describes Honeywell industrial instruments and equipment, including the latest developments.

L—511. Protective Coatings—The Atlas Mineral Products Company announces the availability of a new bulletin on Protective Coatings. The bulletin devotes two pages to each of Atlas' standard coatings. Included in the bulletin are neoprene heavy duty, neoprene extra heavy duty, styrene, chlorinated rubber and epoxy resin based coatings. Atlas manufactures a complete line of corrosion proof cements, coatings, linings and rigid plastic fabrications, pipe and fittings.

L—512. Al_2O_3 for Tumbling Barrels—Borolon Tumbling Abrasive, a four-page catalog bulletin, issued by Simonds Abrasive Company, grinding wheel and abrasive manufacturers, Philadelphia, Pa., describes aluminum oxide lumps and grain for barrel finishing a wide variety of parts and materials. Efficient for deburring, putting a radius on small parts and precision finishing.

L—513. Metalwash Offers Two Booklets—a free 12-page illustrated booklet, "What You Should Know About Vapor Degreasing." With an introduction on the principle of vapor degreasing, the booklet describes the solvent cycle, the vapor degreaser, the vapor spray vapor degreaser, the liquid liquid vapor degreaser, and the metalwash hydraulic lifter for batch type degreasers.

The other is a free 8-page illustated booklet, "Phosphate Coating Comes of Age." With an introduction on the use of phosphate coatings for the protection of metal surfaces, the booklet describes the seven types of conversion coatings most commonly used in industry today and explains the mechanism of the phosphate coating formation.

Trade Literature

L—514. Liquid Level Bulletin—A new 26-page bulletin describing the complete line of liquid level gauges for indicating, recording, controlling, and telemetering has just been released by The Bristol Company of Waterbury, Conn.

The well illustrated, two-color bulletin shows float-type, pressure-type, differential pressure-type, and bubbler-type liquid and water level gauges, in strip and round-chart models. Air or electric controllers are available in several modes.

L—515. H-VW-M Offers Two Bulletins—Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating and polishing equipment and supplies, announces a four-page, two-color bulletin listing its line of products and electroplating and metal cleaning processes.

Intended to serve as a handy reference guide, the bulletin lists 261 products under 63 different classifications. These products will serve every chemical and equipment requirement in the metal finishing industry. Another section outlines 17 plating and cleaning processes and their applications.

Included in the bulletin is a description of ten technical laboratory, training, and research services available to H-VW-M customers.

Another new two-color bulletin on its Grade M Kote-Rax, an improved coating for insulating and protecting racks and fixtures used in electroplating baths is offered by H-VW-M.

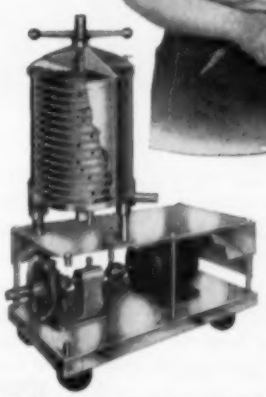
The bulletin tells how to prepare the surface of a rack or fixture before coating, how to blend and apply the primer coat and how to trim excess coating. It also gives information on how to repair accidental breaks.

Besides photographs, the bulletin includes a table that gives air-drying and baking time requirements for all applications.

L—516. Recap of Molybdenum Chemical Bulletins—A new three-page bulletin, "Molybdenum Chemical Bulletins," is now available from Climax Molybdenum Company, New York. Designated Bulletin Ch-3, it lists with brief descriptions all the literature on molybdenum chemicals available on request from the company.

The following are the categories under which the many technical bulletins are listed: chemical data bulletin series; agriculture; analysis; ceramics; colors; corrosion inhibitors; electroplating; literature; lubrication; molybdenum products; preparations; review, toxicity.

guard against Rejects



"Sealed-Disc" Filters were designed especially for plating rooms. They're smaller, compact, and more portable than ordinary conventional Filters, and they are also performing satisfactory results on many acid dips, electro cleaners and solvents.

You can be sure with a "Sealed-Disc" Filter

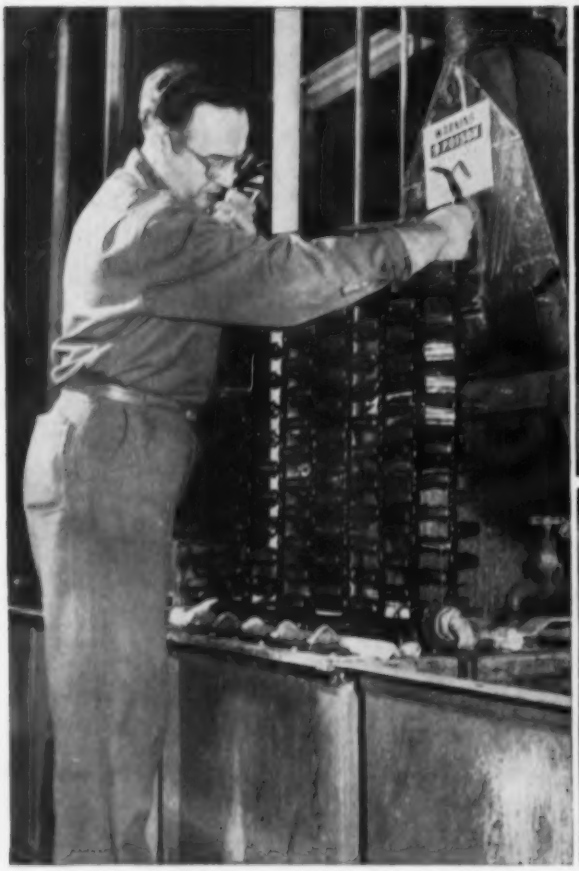
More and more cost-minded platers depend on Alsop *"Sealed-Disc"* Filters to remove dirt, dust, and sludge from their plating solutions. They get better finished plated work, they save time and labor, and their plating solutions last longer. The *"Sealed-Disc"* Filter assures positive, trouble-free performance that's proof against even the invisible impurities that cause nodules and porousness, proof against rejects and reworking. There's a *"Sealed-Disc"* Filter *"to fit your job"*—write for complete information, the Alsop Engineering Corporation, 1005 Fine Street, Milldale, Connecticut.

ALSOP ENGINEERING CORPORATION

Filters, Filter Discs, Pumps, Tanks, Mixers, Agitators

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 530.

Appliance manufacturer saves time and money by using Koppers Potassium Cyanide Solution



About a year ago, a large mid-western appliance manufacturer discontinued the use of potassium cyanide in solid form for their electroplating process, and began using Koppers Potassium Cyanide Solution. They did this for two reasons: (1) to effect an actual cost savings, and (2) because they found that potassium cyanide in solution form is easier to handle. The physical effort of dumping and shoveling cyanide "eggs" is no longer necessary. The cyanide solution is simply drawn out of a drum.

Koppers Potassium Solution (35-40%) completely eliminates the dissolving step in your electroplating operation. It is available in 55-gallon drums which may be cleaned by a simple water wash. Or it can be delivered to you by tank car, and pumped directly into your storage tank, ready to use. For further information, write to:

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Chemical Division, Dept. P-55
Pittsburgh 19, Pennsylvania

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 531.

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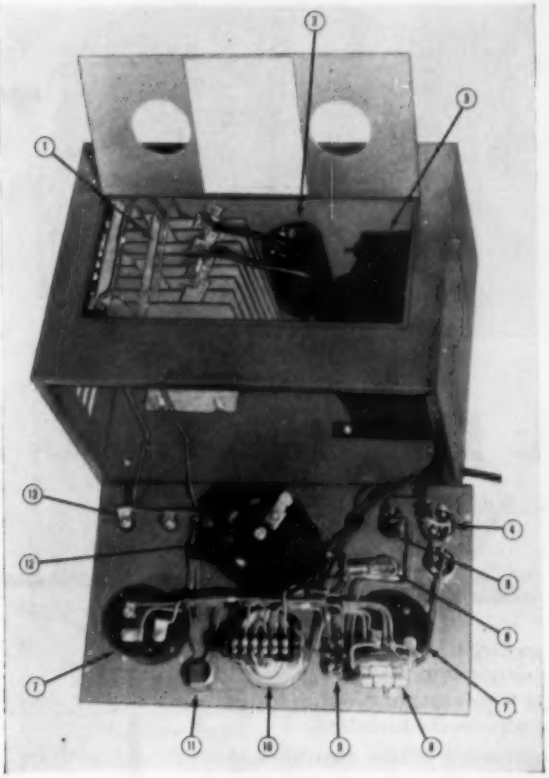
Here are 13 FEATURES to insure PERFECT PERFORMANCE!



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4. Two convenience outlets for 110 volt accessories
5. Line switch—15 ampere, 110 volt rated
6. Pilot light to indicate rectifier "on" or "off"
7. Unique dual-range ammeter for accurate current readings—Voltmeter within 2% accuracy
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9. Timer switch, so that timer use is optional
10. Optional Timer, 0–5 minute, 0–1 hour, or 0–3 hour (as specified) to time plating cycle—Current is cut off at end of desired time (important for Hull Cell tests)
11. Buzzer to show end of plating cycle
12. Stepless autotransformer for smooth, continuous current control from zero to full capacity
13. Output terminals of ample size

AVAILABLE IN 5, 20, 30 AND 50 AMPERE CAPACITIES

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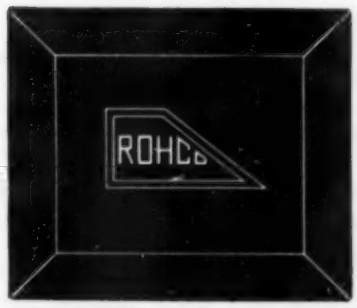

R. O. HULL & COMPANY, INC.
1302 Parsons Court
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Please send descriptive data and prices, TODAY!

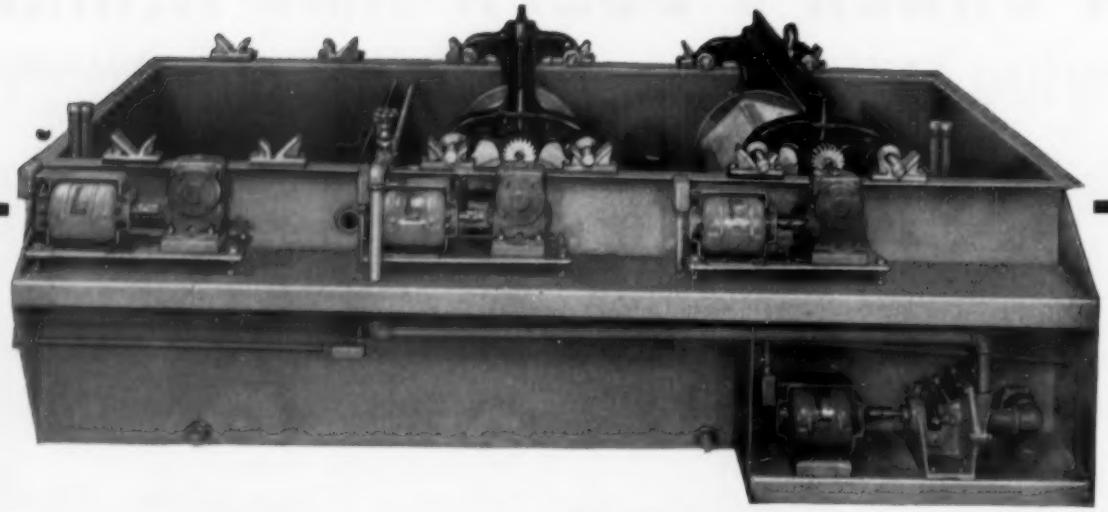
Name ..... Title .....

Company .....

Street Address .....

City ..... Zone ..... State .....

STUTZ



Alkali Cleaning & Rinsing Units

for heavy duty—high speed production

Stutz design in single or multiple units with or without rinsing compartment. Solution circulating pump for rapid elimination of surface grease into trap from which complete removal made by draining of trap compartment daily.

Rotation of work in cylinders together with solution agitation of pump, provides complete cleaning in a single operation.

Cylinder drive and pump motors are 1/3 h.p. 440-220-3-60 with heater type motor control switches. Plate or pipe coils installed.

With this type of equipment, vapor degreasing is not required. Can also be furnished for electrolytic cleaning and P. R. current will do excellent removal of heavy furnace scale, rust, etc.

STUTZ Portable Plating Barrels

Made in 2 standard sizes and smaller.	
Standard openings	3/32"
6"x12" I. D.	$176.50
8"x18" I. D.	$275.00
Stand	$37.50
Basket	$8.65

- The Stutz Portable Barrel is made in 2 standard sizes with cylinders having inside dimensions of 6" x 12" and 8" x 18", I. D., and smaller upon application. Standard openings are 3/32". Smaller or larger openings can be furnished as required.
- Baskets in perforated metals or wire mesh.
- Load/Unload Stand for convenient and fast handling or work load.

Write for prices and New 1955 catalog

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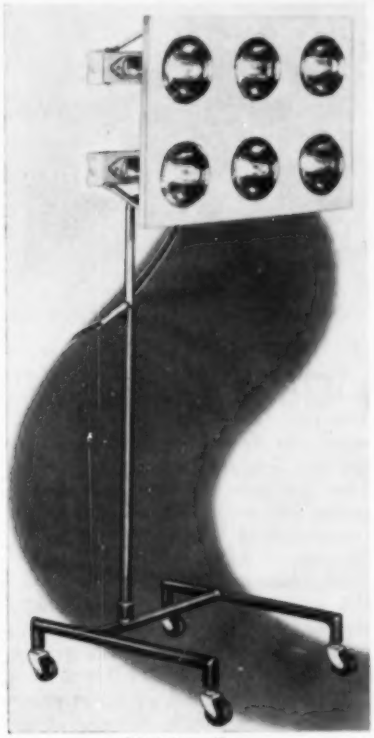
"Complete metal finishing equipment and supplies"

Equipment & Supplies

Please use Reader Service Card for all items in this section



High-Low Dryer

E—517. Portable Infra-Red Drying Units—A new, improved line of Infra-Red portable heating and drying units was recently introduced by North American Electric Lamp Co., St. Louis, Mo.

The new line is designed especially for heating and drying purposes in the automotive, electrical and manufacturing fields. Available with five, six and 13 NALCO inside-aluminumed, self-reflecting, carbon-filament lamps, the new units are adjustable in height from 18 inches to six feet. They are mounted on four free-moving casters for easy maneuverability, making them especially convenient where space requirements are limited.

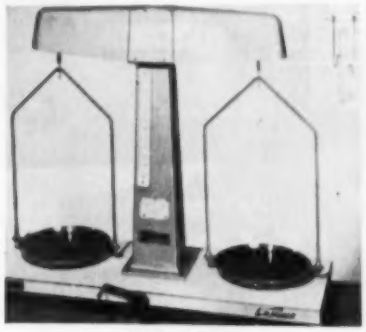
Nalco assemblies can be tilted to any angle or swung in a vertical or horizontal position for concentrated heating and drying. Two or more of these units can be combined to form continuous banks for large area drying when needed.

Strips assembled in three to 14-lamp units are also available from North American. These assemblies can be used for small jobs, or grouped to form banks for large area coverage.

All North American Infra-Red portable units and strips are constructed of tough tubular steel to insure longer wear under heavy factory or shop usage. They come supplied with 20 feet of approved rubber cord and plug.

E—518. Technical Balance with Chain Fraction-Loader—The Reyers-Rapid is the first technical balance (1-kg capacity) equipped with a chain loading device that dispenses with fractional weights. Its outstanding design innovation is the attachment of two chains, one to each arm of the beam, instead of just one, so that raising the beam into weighing position does not upset its equilibrium (see illustration).

It is not necessary to arrest the Reyers-Rapid balance when adding or removing

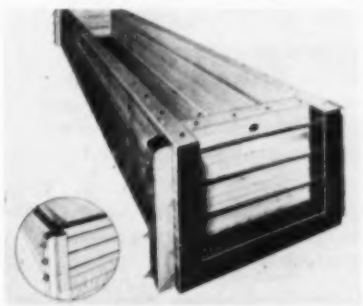


Chain Balance

fractions of grams with the knob-operated chain loader. An indicator shows the value of the weight being added. The chain-loading device is adjustable to 10 mg, the sensitivity of the balance.

E—519. Laminated Wood Tanks—Wood tanks for many years have been used for pickling in the metal working industry, because wood is resistant to acid solutions.

As acid solutions have a dehydrating effect and cause excessive shrinkage in the lesser grades of large "green" timbers, and because steel mills and metal processing



Wood Works Wonders

plants require tanks as long as 60 feet, ordinary wood tank construction has not been entirely satisfactory. To meet the requirement for wood tanks that would eliminate excessive shrinkage and for proper strength in exceptionally long tanks, Wendnagel & Co., Inc., Chicago, Ill., pioneered a new laminated construction.

This construction allows the use of tank grade lumber three and four inches thick (the kind used in the best round tanks). Boards of this thickness can be thoroughly air dried and bolted together to form a tank of the shape usually employed for pickling.

E—520. Heavy Gage Electrolytically-Coated Tin Plate—A new flat rolled product recently placed on the market by Jones & Laughlin, which is producing this new product on the tin plate facilities at its Aliquippa, Pa., works, reports that users have been able to reduce material and processing costs on many stamped, drawn and plated parts.

Where corrosion is not too great a factor, the new tin plate is being used as a replacement for long ternes, aluminum, zinc-coated sheets and other metals of higher cost.

Harry R. Johnson, J&L's manager—Tin Mill Products, lists the following advantages for this matte-finish tin plate:

1. Surface conditions are excellent for subsequent plating and finishing.
2. Good paint adhesion properties.
3. Excellent deep drawing qualities.
4. No need for degreasing by the customer.
5. Uniform in gage—a characteristic of

Tough Tin

products made on J&L tin mill equipment.

6. Uniform ductility due to close temper mill practices.
7. Uniform tin coating.
8. Lower die cost due to longer life as a result of tin lubricity.
9. Weight saving on finished parts formerly made of terne plate.
10. Lower material costs when substituted for many metals.

E—521. Liquid-Cooled Germanium Rectifier—International Rectifier Corporation, El Segundo, Calif., has announced the availability of a 35 kw liquid-cooled germanium power rectifier. This new product is a three phase bridge unit, rated for a maximum of 450 amps. DC continuous output and can be supplied for input voltages of 26-v, 36-v, 52-v and 66-v rms maximum.

need a finish that blocks corrosion by itself—or under paint? specify IRIDITE

You can solve any problem of non-ferrous finishing . . . maximum corrosion protection . . . sparkling clear or colored decorative finishes, firm and lasting base for paint . . . with these two words—"specify Iridite". For example—

- **ON ZINC AND CADMIUM** you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.
- **ON COPPER . . .** Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.
- **ON ALUMINUM** Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.
- **ON MAGNESIUM** Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals, [illegible] L. M. Bondar Co.

Equipment & Supplies

High Efficiency

This rectifier has a volume of approximately 220 cubic inches as compared to 1650 cubic inches for a comparable selenium unit (fan cooled) and 14,000 cubic inches for a copper oxide unit (fan cooled). This new unit requires liquid coolant (water, oil, etc.) at a maximum inlet temperature of 25° C and a volume of ½ gallon per minute minimum.

Efficiencies up to 97 per cent are attainable and the power factor is essentially 100 per cent. Aging is negligible or zero. Rectifier regulation as low as 2 per cent is possible from no load to full load.

The new liquid-cooled germanium power rectifier is applicable for all types of d-c load requirements except those requiring heavy surge currents and those subject to heavy intermittent overloads or occasional short circuits. Sizes of this unit may vary slightly with ratings.

E—522. "High" and "Low" Wing Nuts—The problem of what-to-use when lack of sufficient overhead or side space prohibits the use of standard wing nuts has been solved with the introduction of an extensive line of special duty wing nuts designed specifically for unusual applications. Two such new items—the "High-Wing" and "Low-Wing" Nuts—were de-

Hi-Wing—Lo-Wing

veloped by the Gries Reproducer Corporation as additions to their already broad selection of GRC wing nuts and other fastenings.

As its name implies, the "low-wing" nut has a lower-than-normal wing height, and a wider-than-normal wing spread. The "high-wing" nut, has a narrow, higher-

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HERE'S A TIP ON
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INSTALL POWERS
Automatic Temperature Control
For All Metal Finishing Processes

For plating tanks and other metal finishing processes. Powers Controls quickly pay back their cost by accurately holding solutions at a constant uniform temperature.

POWERS

3

TECHNICAL DATA SHEET
CHROMIUM

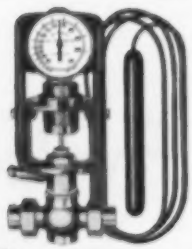
IF you plate—CHROMIUM

***Too high a temperature* can result in:**

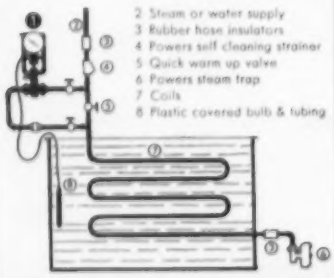
1. Burnt deposits
2. Frosty deposits
3. A decrease in cathode efficiency
4. A loss in throwing power
5. A soft deposit

***Too low a temperature* can result in:**

1. A slow rate of plating
2. Milky deposits
3. A decrease in tensile strength
4. A decrease in deposit density
5. Cracked deposits
6. Dark deposits



1 POWERS No. 11MF Self-Operating TEMPERATURE INDICATING REGULATOR


2 Steam or water supply
3 Rubber hose insulators
4 Powers self cleaning strainer
5 Quick warm up valve
6 Powers steam trap
7 Coils
8 Plastic covered bulb & tubing

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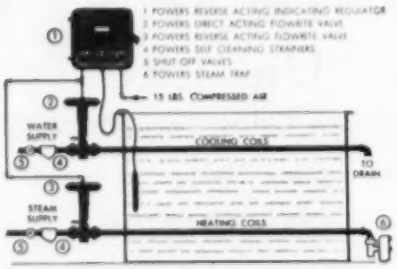

In plating tanks, washers, heat exchangers, degreasers, Powers Temperature Controls more than pay for themselves. They save by stopping costly *over* or *under* heating.

Regardless of the size of your plating operation, there's a Powers Temperature Control precisely suited to your needs.

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☐ Please send Bulletin 330 and Prices on Powers No. 11-MF Temperature Regulator for _____
(Print name of process or type of plating)

☐ Send Bulletin and Prices on Temperature Control for:
☐ Heat Exchangers ☐ Washers ☐ Degreasers

Name _____ Title _____

Company _____

Address _____

Classified Advertisements

Only "Help Wanted" and "Situations Wanted" will be accepted. Rates: $.20 per word, minimum $5.00. AES branch members and members-at-large, in good standing, are entitled to a total of three *free* advertisements in one year. Last day for inserting advertisements is the 10th of month preceding date of publication. When answering advertisements please address as follows: Box number, PLATING, 445 Broad Street, Newark 2, N. J.

SALESMEN
JR. SALESMEN
SERVICE ENGINEERS
. . . see the advertisement on page 582

WANTED—Metallurgist—1—Recent B.S. or M.S. graduate. Work involves metal finishing with emphasis in the electroplating field. Excellent opportunity to learn and advance in a long-established organization. Reply to M1, PLATING, 445 Broad St., Newark 2, N. J.

WANTED—Chemists—2—Recent graduates to undergo training in the metal finishing field in modern electroplating laboratory with superior working conditions. Long-established concern. Excellent opportunity for advancement. Numerous employee benefits. Reply to M2, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Mature administrator (female) with complete understanding of every phase and operation of a plating business desires relocation in Mid-West, preferably in the Indiana area. Business school graduate. Worked as secretary, bookkeeper; has been responsible for purchasing, tax reports, labor contracts, etc. Knows the plating business thoroughly and has worked on many jobs in the shop. Was manager for six years of plating shop which netted close to $100,000 a year. Reply to Box M3, PLATING, 445 Broad St., Newark 2, N. J.

POSITION WANTED—Chemist, 36, 11 years experience includes copper, tin, cadmium, nickel, chromium; batteries, glues and gelatines, and general physical and chemical commercial testing. Seeks Middle Atlantic States locality position. Reply to Box M4, PLATING, 445 Broad St., Newark 2, N. J.

POSITION WANTED—Plating superintendent available; age 38; 2 years college (Chemical Engineering); 18 years plating experience with past 4 as superintendent. Experience includes 3 years hard chrome plating, 5 years electropolishing, 8 years of continuous strip steel plating. Will relocate anywhere. Reply to Box M5 PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Assistant to plant superintendent; 12 years specialized experience supervision of diversified plating and metal finishing including methods, process and quality control, and production scheduling. Can set up programs for maintenance, remodeling, and/or expansion of facilities. 11 years AES member, 2 years branch president. Reply to Box M6, PLATING, 445 Broad St., Newark 2, N. J.

WHICH METAL-CLEANING JOBS WOULD YOU LIKE TO IMPROVE?

Listed below are some of the operations discussed in Oakite's 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite methods can give you better production with greater economy.

Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING

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MATERIALS · METHODS · SERVICE

OAKITE PRODUCTS, INC.
40 Rector St., New York 6, N. Y.

Tell me about Oakite methods and materials for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling, deoxidizing
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention
- ☐ ALSO send me a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*.

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Company _____

Address _____

"the Streamliner"

Sel-Rex DOUBLE DUTY FILTER

IT'S ONLY **14 INCHES** SQUARE AND HIGH . . .

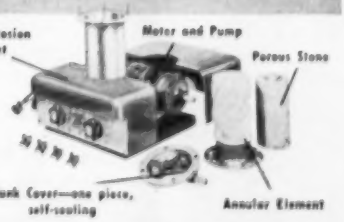
IT'S ONLY . . . **45 POUNDS**

BUT ITS CAPACITY IS **250 GPH**

If you are looking for high capacity filtration with no space loss . . . here is a "handful" of filter mechanism that does a sensational job . . . thanks to the new Sel-Rex filter principle that makes it possible.

MINIMUM MAINTENANCE . . . with the new ANNULAR element, this filter can be completely cleaned in less than 5 minutes. All working parts are protected, yet are easily accessible for routine servicing.

DOUBLE VOLUME . . . the new Sel-Rex ANNULAR element doubles filtering area and volume without increasing size. Filter can be used with either new ANNULAR element or porous stone. No conversion parts required.



Exploded view of the "STREAMLINER". One-piece, self sealing tank cover.

Write for literature.

BART MESSING CORPORATION

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AN INVITATION—

To Authors.

From The Editorial Board

of

PLATING MAGAZINE

FOR more than forty years the AES has been the society which fosters, supports, and publishes the latest and best scientific developments in the metal finishing industries.

Its magazine, PLATING, is the authority, the bible in its field. It follows that to publish in PLATING is to gain professional recognition and standing.

It is also true that publishing in PLATING passes valuable information on to men who are of the same professional standing and who can use such information to advance their own work.

PLATING is the meeting place of scientists; the exchange media of manufacturers and workers; the common ground of know-how and experimentation; the beacon of today that lights the way into tomorrow.

QUESTIONS FROM AUTHORS WITH HELPFUL ANSWERS FROM THE EDITORS

Q. What type article is wanted for PLATING?

A. Any article which deals with the finishing of products and might be classified as: a) Those recording the results of original research. b) Those describing important practical developments. c) Critical reviews of existing information.

Q. Does an author have to be a member of AES to publish in PLATING?

A. No. All authors get equal consideration from a Board of Reviewers who consider each manuscript—WITHOUT KNOWLEDGE OF THE AUTHOR or origin of the manuscript.

Q. What form should the manuscript take?

A. The manuscript should be typewritten, double-spaced and in quadruplicate to expedite review. The title should be brief. A biographical sketch of the author should also be submitted together with his picture.

Q. What about illustrations?

A. Photos should be glossy prints. Drawings should be done in India ink on white paper and be suitable for reduction. Every picture and drawing must be accompanied by a caption.

Q. What length should articles be?

A. There is no restriction as to length. The only caution is that all irrelevant matter must be avoided. No anecdotal matter should be included at all.

Q. Is every manuscript published in PLATING?

A. PLATING cannot commit itself to publish every paper submitted to it. However, if for some reason the manuscript is tno suited to PLATING it is promptly returned. The Board of Reviewers must pass on every manuscript submitted. (It does not follow that a "rejection" from PLATING infers any reflection on the quality of the manuscript. Usually, rejections are for reasons of the narrowness of the field which PLATING serves.)

Q. Must every manuscript be original?

A. Yes. No "reprints" or "rehashing" is tolerated. However, a general review of a field can be considered, but not as scientific article.

Some Recent Contributors to PLATING

Roehl

E. J. ROEHL has been manager of technical development at the Thomas Strip Division of the Pittsburgh Steel Co. since 1948. For 11 years prior to this period he was engaged in research work for the International Nickel Co. He is a graduate of Cornell University.

R. DIAZ received his B.S. in Chemical Engineering from the University of Puerto Rico (1948) where he later was an instructor in Chemistry. He also holds an M.S. degree in Analytical Chemistry from the University of Minnesota. He is at present with Minneapolis-Honeywell Regulator, Minneapolis, Minnesota, as an analytical chemist.

Diaz

Westbrook

L. R. WESTBROOK of Solon, Ohio, is a consultant to the electrochemical industry. He was formerly research manager of the Electroplating Division of the duPont Co., and is a graduate of the Massachusetts Institute of Technology.

E. B. MICHEL is a research chemist with the Thomas Strip Division of the Pittsburgh Steel Co. After his discharge from the Air Force he returned to Hiram College, he received his B.A. degree in 1948 and assumed his present position at that time.

Michel

Ogburn

FIELDING OGBURN is Assistant Chief of the Electrodeposition Section of the National Bureau of Standards. B.S. in Chemistry in 1941 from the University of Chicago. Served in the Army in Italy in World War II. Joined Dr. Blum's group at NBS in 1946. Delegate and Past President of Baltimore-Washington Branch, AES. Director AES Project 13, Chairman Washington-Baltimore Section of the Electrochemical Society. Chairman Sub-committee 1 of ASTM Committee B-8.

HARRY I. SALMON, a native of Lock Haven, Pennsylvania, is a chemist in the Electrodeposition Section, Chemistry Division, National Bureau of Standards, Washington, D. C. After several years' experience in industrial laboratories in Pennsylvania, joined the staff of NBS in 1936, and since that time has been a member of the Organic Coatings and Electrodeposition Sections.

Salmon

Wilhelm

DR. E. WILHELM is Assoc. Professor of Chem. Engineering at the U. of Notre Dame. He returned to teaching in 1938 after eight years with the Res. Div. of The N. J. Zinc Co. of Pa. He has been an active member of the St. Joseph Valley Br. (AES) serving as president 1951-2. He is a member of the AICHE, ACS, and ASEE.

R. F. KAYSER received his B.S. and M.S. degrees in Chemical Engineering from the University of Notre Dame in 1948 and 1949, respectively. After working two years for the Plaskon Division of the Libbey-Owens-Ford Glass Co., he attended the University of Cincinnati where he obtained his Ph.D. in Chemical Engineering. Since graduation in 1952, Dr. Kayser has been with the Linde Air Products Co., Silicones Division.

Kayser

Serfass

DR. EARL J. SERFASS, Head of the Chemistry Department at Lehigh University, is serving his second consecutive term as chairman of the AES Research Committee.

DR. RALPH F. MURACA is an assistant professor in the department of chemistry at Lehigh University. This report incorporates results of AES Project 2 at Lehigh University with which he was associated.

Muraca

Equipment & Supplies

than-average wing spread. Both types of nuts, are available on special order for special needs. Like the standard senior and junior GRC wing nuts, both new items feature the exclusive GRC finger-grip recessed wings, and clean threads.

All GRC fastenings—and the line includes wing screws, cap nuts, round head thumb nuts and thumb screws, as well as wing nuts—are die cast of a nonferrous, rustproof, corrosion-resistant zinc alloy. The plain bright finish withstands normal usage, or parts may be obtained in all commercial finishes when desired.

E—523. New Honite Compound—A new barrel finishing compound designed to produce especially smooth finishes on light metal die castings has been announced by Minnesota Mining and Manufacturing Co.

Called Honite brand micro cut, the compound is recommended for use on die castings of zinc, aluminum and other light metal alloys. It will remove light machine marks and leave an extremely fine surface finish, with a minimum of stock removal, avoiding deep scratches and exposure of porosity in castings.

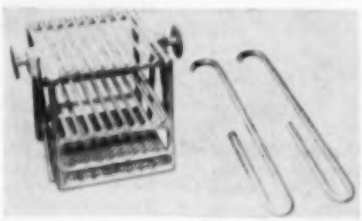
The smoothness of the surface produced by the compound—containing a very fine mineral grain which gives it a mild abrasive action—improves the quality of subsequent plating and ball burnishing operations, according to the manufacturer.

E—524. A new rust-inhibiting phosphate coating which improves appearance and durability of painted finishes on all metal household appliances, automotive parts, components, metal furniture, etc., is announced by Man-Gill Chemical Co., Cleveland, Ohio.

This new formulation known as MG-601 was developed to produce a rust-inhibiting phosphate coating in excess of 150 milligrams per square foot. According to the manufacturer, salt spray tests of metal treated with new MG-601 prove an increased life of painted finishes of from three to five times over the same painted metal untreated with MG-601. As a paint base the fine grained crystalline structure of MG-601 provides the paint film with improved adherence in addition to increased resistance to humidity and salt spray.

E—525. Conveyor Basket Unaffected by Corrosive Conditions—Used on an automatic jack rabbit salt bath conveyor, it takes approximately three hours for the basket to go through the complete heat treating, washing, and drying cycles. Temperature of the heat treating cycle is 1650° F. Forty minutes are spent in the carburizing bath, and quenching is in agitated oil at 120° F.

The conveyor operates on a 24 hour basis, 5 days a week, and the first of the baskets, put into use four months ago, shows no signs of corrosion or warping. The service has been severe due to the corrosive action of the salt and the heating and quenching cycles.



Automatic Action

The basket allows completely automatic loading and unloading, carries a maximum number of parts in a minimum space, and exposes the largest possible surface area of each part to contact with the molten salt and quench oil. It allows for good salt drainage and easy cleaning, and minimizes warpage of parts.

The baskets are manufactured by Wire-tex Manufacturing Co., Fairfield, Conn.

Foot Action

E—526. Compact, Lightweight "Cadet" Switch—Newly developed by the Linemaster Switch Corporation of Woodstock, Conn., the Linemaster "Cadet" foot switch is small, rugged and compact for hundreds of commercial and industrial applications.

Little larger than a pack of cigarettes (3⅝ inch diameter x 1⅛ inch high) the "Cadet" is a precision built mechanism housed in rugged steel case with unbreakable plastic cap that assures many years of wear and eliminates valuable "down time." The nonskid sponge rubber base assures perfect positioning always.

The slightest foot pressure from any angle on the actuating cap of the "Cadet" puts the switch in operation—gives the operator better control of work, assuring better quality production.

The Linemaster "Cadet" is furnished with heavy duty 6-ft. 18-2SV black rubber cord set with a series plug and molded strain relief grommet.

E—527. Concrete Protected—The Ceilcote Company, Inc. announced that trenches, tank bases and other concrete surfaces can be successfully protected against the corrosive effects of Perchlorethylene and Hydrochloric acid spillage.

A combination of three Ceilcote materials is used to obtain corrosion-proof

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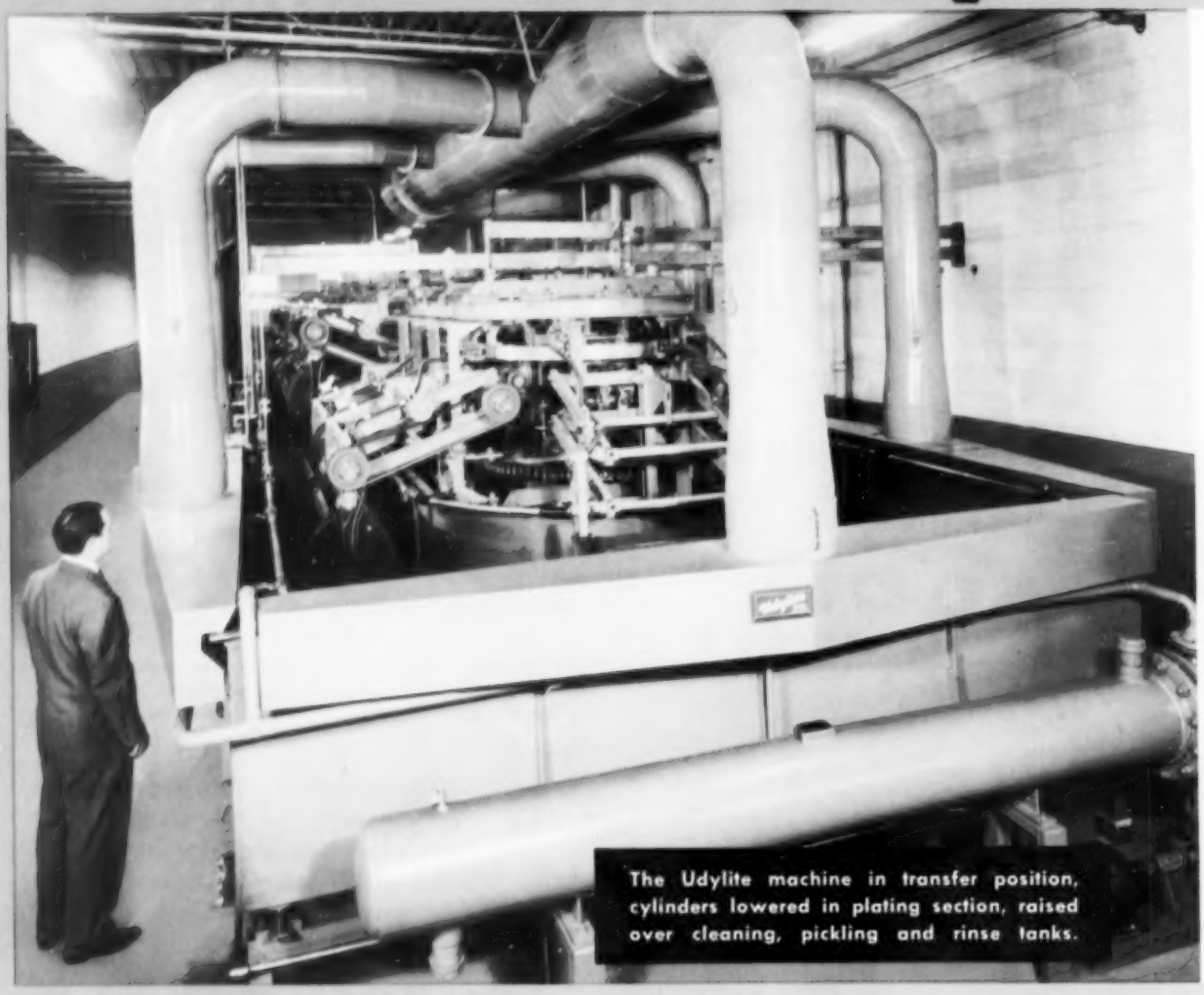


The Udylite machine in transfer position, cylinders lowered in plating section, raised over cleaning, pickling and rinse tanks.

THIS is the new Udylite full automatic barrel plating machine. A heavy duty, high production, return type unit, designed and built for any standard plating process. It uses any of the standard Udylite barrel plating cylinders.

Udylite's years of experience as the leading manufacturer of barrel equipment along with more than four years of development of this new machine bring many design features new to the plating industry.

With the Udylite full automatic barrel plater you get excellent tumbling conditions with uniform distribution of deposit as is inherent in plating with horizontal cylinders. It is flexible, and gives high productivity with specification plating.

Here are additional features: The cylinders may be operated at different speeds. As an example—one speed in cleaning and plating and a much slower speed in dichromating and subsequent tanks.

Electrically and mechanically operated, the machine is designed so that none of operating mechanism is over the tanks except the vee-belt drives. Three electrical timers located in the control panel regulate the number of cylinders per hour, the delayed set-down and the dwell when the cylinders are raised out of the tanks.

Cylinders may be left in the "Up" or "Down" positions indefinitely—all regulated from the control panel. The cylinders also rotate in the "Up" position before transfer, reducing the drag-out to a minimum.

The lift mechanism allows for the raising or lowering of any cylinder at any station independently of the rest of the cylinders. The machine may be pre-set for a given cycle within its range, but all cylinders need not follow the same cycle.

The Udylite automatic barrel plating machine offers the maximum in economy and service and the minimum in maintenance.

THE NEW *Udylite* AUTOMATIC BARREL MACHINE

FLEXIBILITY Any cylinder at any station is potentially capable of being raised or lowered independently of the rest of the cylinders. This is accomplished by delayed set-down or skip mechanisms. The machine may be pre-set by the operator for a given cycle within its range, and all the cylinders need not necessarily follow the same cycle. The number of cylinders per hour is controlled by the setting of the electric timer.

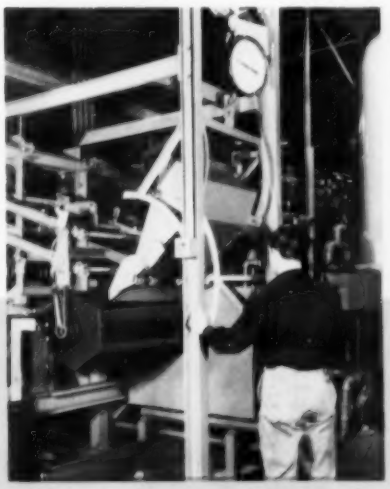
SPECIFICATION PLATING The machine may be set for a given thickness of deposit on so many square feet of work per cylinder load. The relationship between weight and surface area of the work may be established from a system of charts, and a given weight is put in the cylinder. The weighing scale at the loading station measures the load.

HIGH PRODUCTIVITY The given load is placed in the cylinder and the machine set for so many cylinders per hour, and the production is constant. To assist in faster plating, truly conforming anodes are used, and for zinc and cadmium solutions, the anodic charge is made at the bottoms of the anode containers as well as at the hooks.

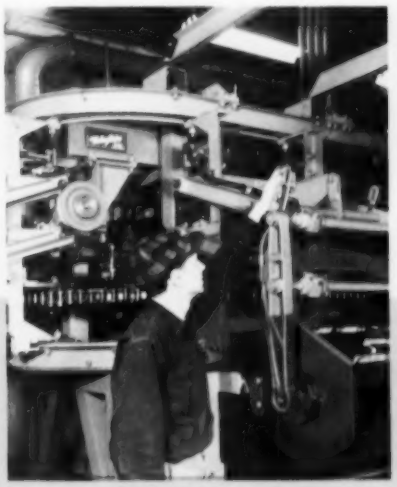
LOADING Loading is accomplished by a power operated hoist which raises the load and discharges it into a cylinder. A weighing scale is used in connection with the loading.

CYLINDERS Cylinder size is 14″ x 30″. They are very easily removed from the machine. Tumbling of the work "across" the cylinder is uniform because of the horizontal rotation and this is conducive to more uniform distribution of plate from part to part within the load. The cylinders themselves, being made of either Tempron hard rubber or acrylic resin (Lucite or Plexiglas) have excellent abrasion resistance.

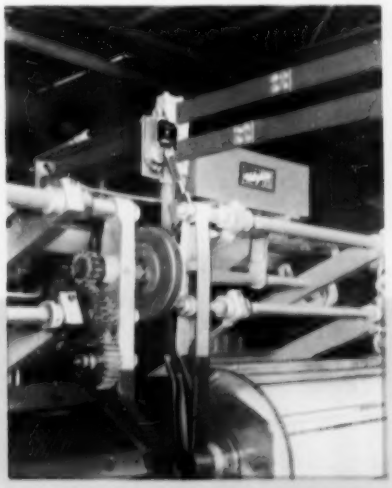
CURRENT The machine is equipped with Udylite Selenium Rectifiers. In the unit illustrated two rectifiers are used. One is 1500 ampere, 12 volt for the electrocleaners and reverse cyanide. The second is 7000 ampere, 12 to 15 volt for the plating tank. With eight cylinders plating this gives 875 amperes per cylinder. The machine may be bussed for 1000 amperes or more per station.



A view taken from the loading end of the machine. Here you will note the power-operated loading chute, the hoist, the weighing scale and the Tempron hard rubber plating cylinder. Only one man is required to operate the machine.



Operator setting skip transfer mechanism. Any cylinder at any station can be raised or lowered independently of the rest. The machine may be pre-set for a given cycle within its range, and all cylinders need not follow the same cycle.



Mechanism pre-set by the operator is here shown tripping the limit switch activating the panel board timer to delay the cylinder immersion or to hold the cylinder in the "Up" position for transfer without immersion at this station.

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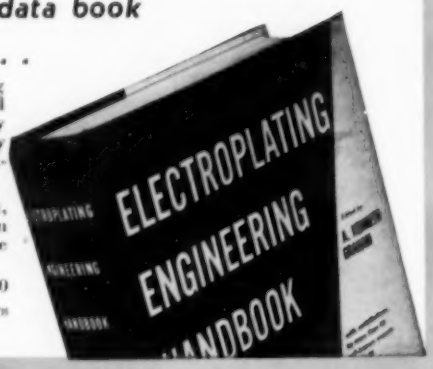

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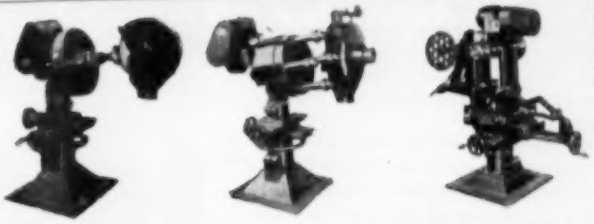
ACME *Semi-Automatics*



ACME Semi-Automatics are built to "deliver the goods." They can be fully relied upon to cut finishing costs, maintain production levels and stand up under long hours of operation!

The three ACME Semi-Automatics above are from left to right, the ACME A-2, a 2 spindle hand indexing machine for polishing and buffing cylindrical parts up to 12" diameter . . . the ACME L-4, a 4 spindle automatic indexing machine with a normal range of 250 to 400 indexes per hour . . . and the ACME D-10, an oscillating machine for finishing out of round parts. These machines are proved producers.

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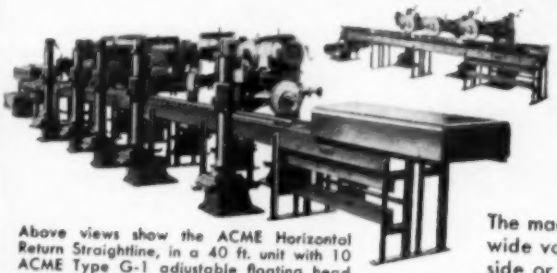

Above views show the ACME Horizontal Return Straightline, in a 40 ft. unit with 10 ACME Type G-1 adjustable floating head polishing and buffing lathes . . . and a 20 ft. unit with 3 ACME Type G-3 lathes.

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ACME Straightlines provide effective solutions to many finishing problems. ACME progressive experience and engineering assure dependable performance at high production levels.

The machine illustrated is unusually versatile and adaptable to a wide variety of work. It may be loaded or unloaded from either side or either end. Polishing and buffing heads may be used on either or both sides and may vary in number to suit the required production and finish.

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ACME 40" Rotary with 6 station indexing table and 4 ACME Type G-1 lathes with belt arm attachment. One second indexing time . . . up to 1800 indexes per hour. Acme Indexing Rotaries are available in table sizes from 18 in. to 10 ft. diameter.

ACME 10 ft. Combination Rotary . . . for continuous operation using 24 continuously revolving spindles or for 12 station indexing operation using every other spindle. One second indexing time . . . up to 1200 indexes per hour.

ACME 50" Continuous Rotary Automatic with 40 spindles equipped with 4 Acme Type G-3 heavy duty 15 H.P. polishing and buffing lathes with inverted spindles. ACME Continuous Rotaries are available with tables up to 24 ft. diameter.

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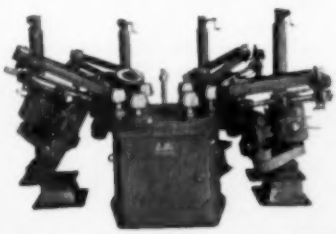

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surfaces; shale acid-proof brick, Corobond resin cement and Ceilcrete "B," a plastic-base thermosetting coating. In application, the entire surface to be protected is coated with 1/8-inch of Ceilcrete "B," then shale brick is set in Corobond resin cement. This provides an impervious monolithic surface.

An improved synthetic resinous bonding cement for brick and tile, Corobond features outstanding qualities of workability, chemical and thermal resistance. In addition, Corobond hardens to an extremely dense material which provides high mechanical strength. These properties offer excellent economies in both application and long service life.

Ceilcrete "B," a trowelled-on acid-proof coating, hardens into a stonelike material that is chemically equal to acid-proof brick in many applications. It can be applied much more quickly than brick and at a fraction of the cost.

E—528. Low-cost, Standard-model Barrel Finishing Machine—This new

Barrel Finisher

barrel has many features of the deluxe model. It has been added to its line of Honite brand barrel finishing equipment, according to Minnesota Mining and Manufacturing Co., St. Paul, Minn.

Called the VS model, the machine has all moving parts enclosed. Safety features include a pivot-mounted gate which closes when the machine is in operation, and a magnetic brake.

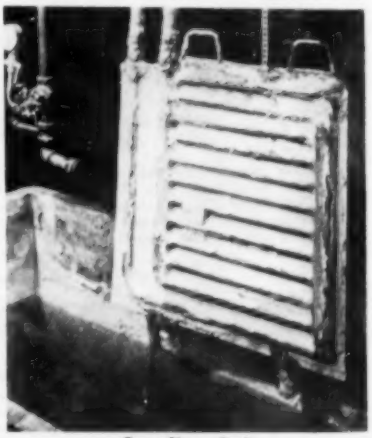
All lubrication points are readily accessible, since the motor, speed reducer, speed changer and brake are mounted in a single unit at the rear. The cylinder can be removed without disassembling the machine.

The VS model has a steel frame, with oversize pillow blocks and self-aligning bearings which are capable of carrying full loads of steel burnishing media.

In addition, there is a large amount of space underneath the barrel to facilitate rapid unloading, and all controls are front-mounted at a working height.

The VS model is available in three power ranges, with a 1½ hp motor for ordinary requirements; a 2 hp motor for heavy duty work, or a 3 hp motor for extra heavy finishing jobs.

E—529. Tranter Platecoil "Shocks" Off Deposits—This 22 inch x 23 inch Platecoil has heated a 110-gallon phosphotizing tank, in daily use, without downtime. The only time it was removed



Stay-Clean Coil

in more than a year was to have this picture taken. Built of electropolished stainless steel, it has required no cleaning or repairs. Any deposit that builds up on the coil during the course of operation is "shocked off" when the steam pressure is dropped in the coil. The heat transfer unit is made by the Platecoil Division of Tranter Manufacturing, Inc., of Lansing, Mich.

E—530. Murray-Way Announces Improved Filter—The Murray-Way Corporation of Birmingham, Mich.—designers and manufacturers of automatic polishing, buffing and filtering equipment—have developed an improved automatic filter for all types of industrial filtration.

Known as the Model 10, this Murray-Way filter features basic improvements in the removal of the contaminant, elimination of tuning rods, and an enlarged filtering area.

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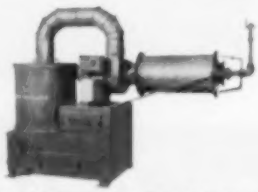
New Holland Machine Co., New Holland, Pa.

2. **With Auxiliary Steam Heating Unit.** Used for small parts that hold moisture—lacquered parts—or where cold water rinse is used. Shown with J.I.C. control—N.E.C. control also available.



3. **With Auxiliary Gas Heating Unit.** Used for small parts. Caution: Do not use with inflammable materials.

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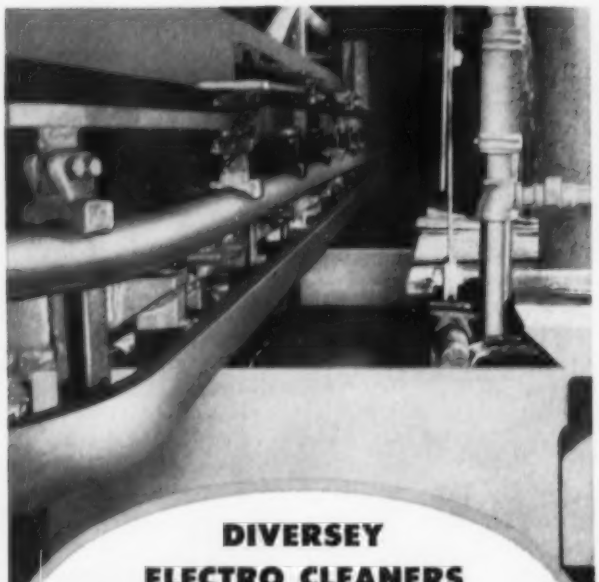

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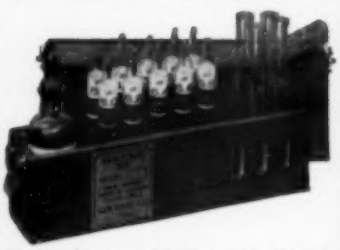
- Other sets are available for the control of Black nickel solutions, and other ingredients such as hydrogen peroxide, sodium perborate, epsom salts and sodium sulfate in nickel solutions.

pH Control of Nickel Solutions



pH of the nickel solution can be controlled at the tank with the Kocour pH Comparator Model BCG (range 3.8–5.4) or model BCP (5.2–6.8). In Bright Nickel solutions, control pH with the economical Kocour Quinhydrone pH Meter Model A.

- KOCOUR are specialists and pioneers in testing equipment for controlling plating — cleaning — pickling — anodizing — and hardening processes . . . special sets can be provided for your requirements.

Write today for further information—no cost or obligation.

KOCOUR COMPANY
4801 S. ST. LOUIS AVENUE
CHICAGO 32, ILLINOIS

Specify KOCOUR test sets from your supplier.

VISIT US AT THE AES CONVENTION—CLEVELAND, JUNE 20-23

ALWAYS FINISHES FIRST

—and lets buffs live up to 400% longer

fast cutting, easy cleaning with

Liquimatic®

the perfect liquid compound for all metal finishing

It's a fact—Liquimatic's continual lubrication lengthens buff life up to 400%. It's not hard to figure that such a healthy saving on buffs soon pays for a complete Liquimatic Application System—a system that *continues* to save you money in all phases of your buffing and polishing operations.

Liquimatic saves on production costs because it's completely automatic. An electrically timed system feeds Liquimatic Compound to the buff in exactly the right amount to produce the exact rate of cut you need. There's no compound wasted, no nubbin problem. No hand application, no changing bars, either—can you see any savings here in your buffing room?

Check the other features of Liquimatic Liquid Buffing Compound... then write today for your free copy of Liquimatic's folder that tells the whole cost-saving story of Liquimatic in *your* buffing room.

Liquimatic . . .

gives more buff mileage

These additional Liquimatic features mean real savings in terms of time, money, safety—

• completely automatic • fast cutting • lower compound cost • easy cleaning • adhesive slow-wearing buff face • non-settling • high flash point • long storage life • sprayable viscosity

1433

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY

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INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

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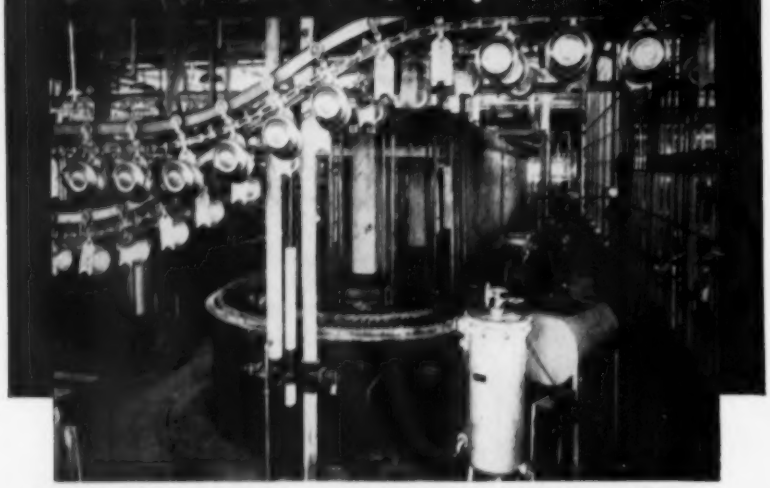
MEAKER
ENGINEERED
Plating Equipment



DESIGNED FOR HIGHEST EFFICIENCY in YOUR PARTICULAR OPERATION

MEAKER puts engineered efficiency into its line of plating, anodizing, phosphatizing, and other processing equipment. MEAKER engineers will help you determine what specific kind of equipment you need . . . and then see that you get it! Whether you need standard or special, fully automatic or batch type, straight-away or return style, through MEAKER'S recommendations you can be *sure* of getting the ideal installation for your particular process. Many years of experience designing and constructing plating equipment for some of the nation's top industrials has given us the technical ability that assures you the utmost in efficiency—high production plating at low unit cost.

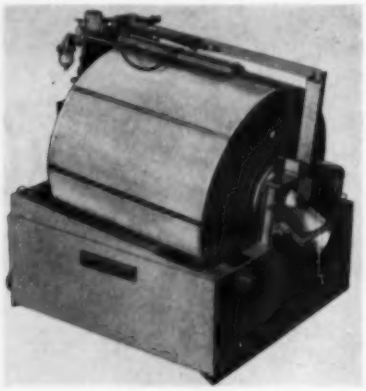
Call or write today and have a MEAKER representative survey your problem with you at no obligation. You may be pleasantly surprised at the results.

MEAKER PRODUCTS

Write, Wire or Phone for Details on How Meaker Service Can Help You Toward Better Plating at Lower Cost.

THE MEAKER COMPANY
1633-41 SOUTH 55th AVENUE • CHICAGO 50, ILLINOIS
Phone OLympic 2-2110

Equipment & Supplies



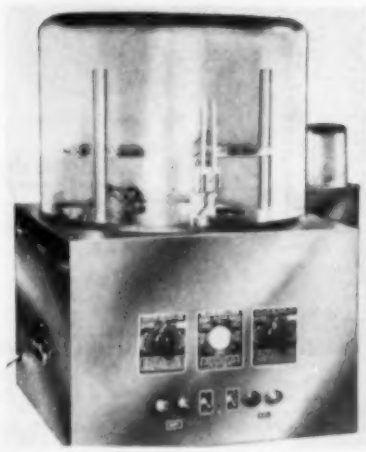
Fine for Filtering

The Murray-Way Model 10 Filter automatically rotates fresh filtering area into position while simultaneously ejecting the contaminated cake. Filtering screen is divided into eight equal parts—screw-mounted. Filter screen material and size of screen opening can be supplied in monel, stainless steel, brass or bronze to fit all requirements.

Contaminant retained on the filter screen is removed by air pressure and is dropped directly into the exit chute. Through the filter float control the air unit is actuated only when the drum turns. That operation occurs only when the contaminant cake restricts filtering and the liquid level rises to operate the float control.

Elimination of the tuning rods permits the enlargement of the filtering area approximately 15 per cent without enlarging the small floor area already occupied.

E—531. Vapor-Temp Controlled Humidity Cabinet—New revolutionary idea, for the first time, Blue M makes



Convection Control

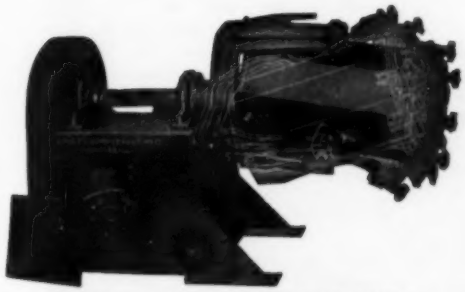
available to all research and testing laboratories a versatile and accurate low-cost

USE "RELIANCE" PRODUCTS FOR

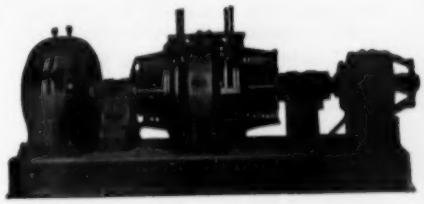
ECONOMY : EFFICIENCY : DEPENDABILITY

LET US SUPPLY YOUR NEEDS FOR YOUR PLATING OR POLISHING DEPARTMENT

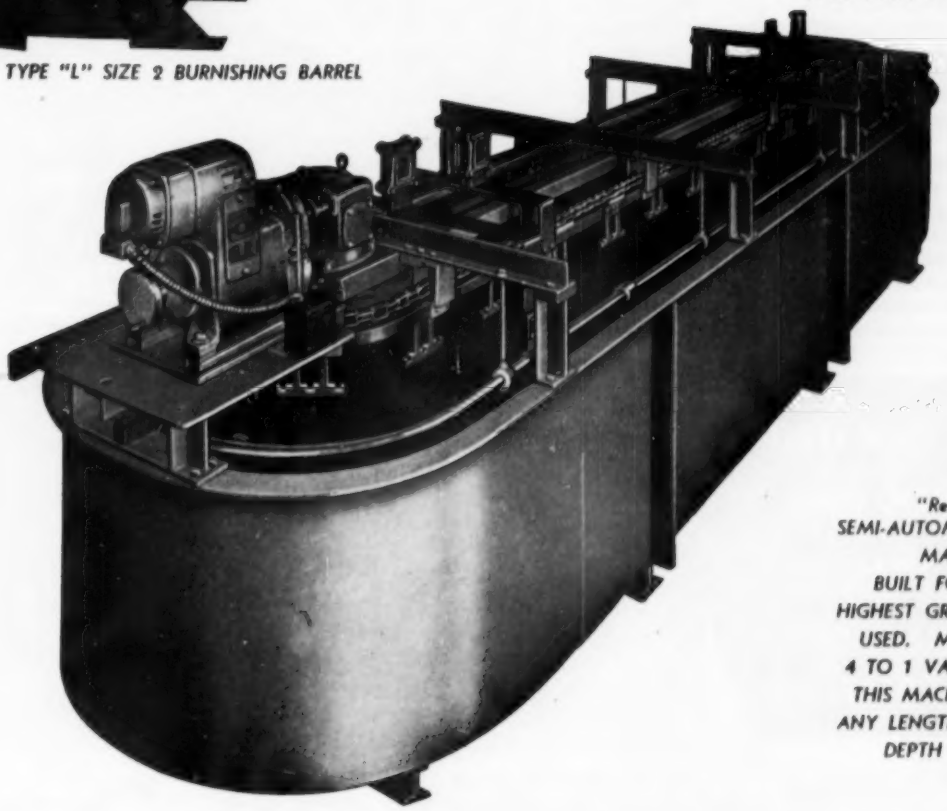
WRITE FOR FURTHER DETAILS



TYPE "L" SIZE 2 BURNISHING BARREL



3000 AMP. 6 VOLT GENERATOR SET



"Reliance"
SEMI-AUTOMATIC PLATING MACHINE
BUILT FOR SERVICE
HIGHEST GRADE MATERIAL USED. MOTOR ½ HP
4 TO 1 VARIABLE SPEED.
THIS MACHINE IS BUILT ANY LENGTH, WIDTH AND DEPTH OF TANK.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Furnished

Chas. B. Little Co.
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Equipment & Supplies

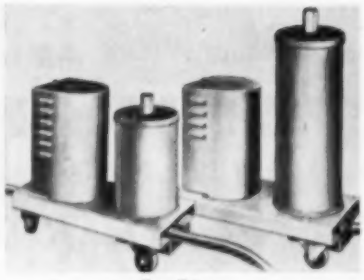
mechanical convection temperature controlled relative humidity cabinet, known as VAPOR-TEMP.

One hundred per cent accessibility, 100 per cent visibility, eight point hermetically sealed lead-in terminals and adjustable air flow makes this convenient low-cost controllable humidity cabinet ideal for short and long term tests, including most MIL and JAN specifications.

Blue M automatically controls relative humidity from 20 per cent to near saturation, at any point, depending upon dry bulb temperature. Accuracy of wet bulb within ±2 per cent; dry bulb accuracy ±1° F from ambient to 158° F (70° C).

This ingenious Blue M Idea uses an inverted Pyrex Jar (16 inch x 12 inch), 1.25 cu ft working area as the work chamber; thereby cutting costs of fabricating expensive double wall alloy cabinets. No doors to seal, no leakage, no corrosive problems.

E—532. Lea Develops Filter for Alkaline Plating—The Lea Manufacturing Company, Waterbury, Conn., specialists in surface finishing methods, equipment and supplies, is placing on the market the cLEAn-FLO Filter, a new portable type filter for clarifying alkaline plating solutions and other alkaline type liquids, coolants and lubricants, without the need of filter aids. Two models are available—economy and standard—each offering the same flow rates. The economy filter will handle from 100 to 150 gallons of activated carbon treated solution between tube changes; the larger standard unit from 500 to 1,000 gallons. The Moyno Pump, used on these filters, delivers up to 800 gph against zero psi back pressure and from 500 to 600 gph against 50 psi back pressure.



Fast Filters

The principle of cLEAn-FLO Filtration involves the use of filter tubes of special honeycomb construction providing "depth filtration" with minimum clogging effect.

The hard-chrome plated stainless steel impeller rotates in a soft synthetic rubber stator and is self-lubricated by the liquid being pumped. A self-adjusting rotary seal on the shaft operates under pressure, preventing leakage and reducing the possibility of solution aeration. Positive flow provides smooth, non-vibrating action, reducing turbulence to a minimum.

The Moyno self-priming pump is assembled with the filter to provide a compact portable unit, protected from splashing and mounted on a base with wide swivel type casters, providing great portability.

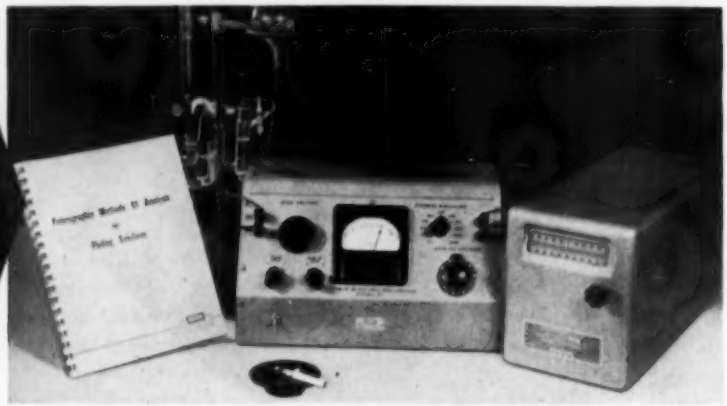
E—533. Oxyphen pH Papers. True Brite Oxyphen pH Papers provide a new and simple method of testing pH rating of electroplating solutions. No separate color charts or comparison charts are needed with the new type papers which provide an instantaneous reading of the pH rating when the color of the indicator bar is compared with the nearest constant color bar.

Thirty separate ranges are available to cover all of the practical conditions of pH ratings from acid copper solutions (0.3 to 1.8) to cyanide copper solutions (11.5 to 14.0).

pH papers are packaged in a plastic box which fits inside a shirt pocket. Each box holds 200 papers and as many as six different ranges can be carried at one time, each of which is readily identified through the plastic cover.

pH Paper

WE CUT OUR OWN ANALYSIS TIME BY MORE THAN 50% WITH THE C-1 ELECTRO-POLARIZER



We do a great deal of electro-plating at the Patent Button Company—not only on our own products, but also on contracts for many other firms—much of it to strict Government specifications. We plate with copper and zinc cyanide, cadmium, brass and nickel solutions.

Analyses in 20 Minutes!

Before we developed the Patwin C-1 Electro-Polarizer, we spent an average of 60 minutes in analyzing a typical solution by chemical methods. Now, with this instrument, analyses of very high accuracy are completed in 15-20 minutes! Our production has been speeded considerably, and we want to pass the news along to other electro-platers facing the same problem.

Top Quality! Low Cost!

The Patwin C-1 Electro-Polarizer needs only a standard 110 A/C outlet—comes in a steel case which takes up only 6 square feet of bench space—incorporates the finest components we're able to lay our hands on (the galvanometer, for instance, is GE's high sensitivity portable model)—and costs about $100 less than any other polarographic instrument we've ever heard of!

New Step-by-Step Manual

We've gone one step further. Our new 65-page manual (just off the press) tells the plater—step by step—how to use the C-1 Electro-Polarizer to find the exact content of his plating solutions—in *Minutes!* It also has alignment charts for 19 common solutions which reduce computations to slide-rule simplicity.

The Patent Button Company

PATWIN INSTRUMENTS Division
THE PATENT BUTTON COMPANY, Waterbury 20, Conn.

Please send me more information about your Patwin C-1 Electro-Polarizer.

NAME_____

FIRM_____

ADDRESS_____

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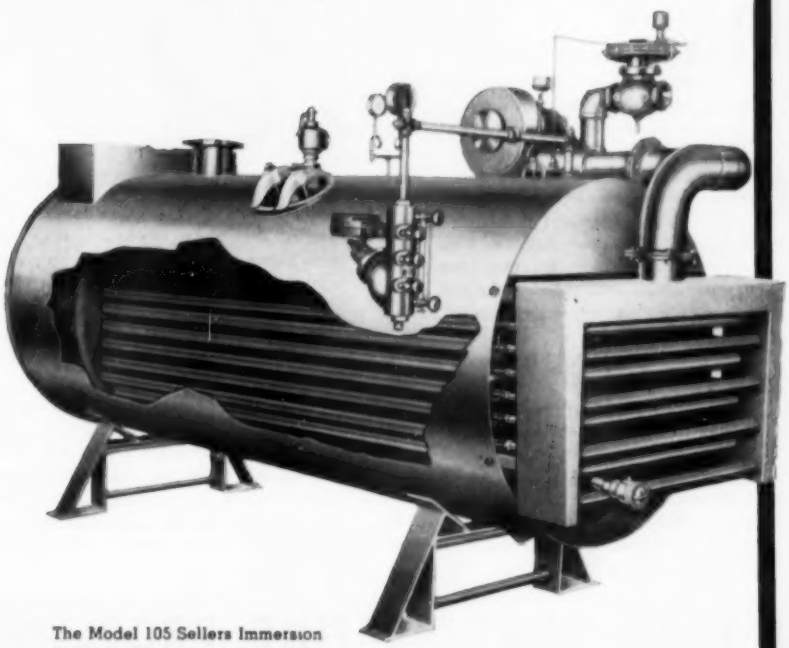
There's a good reason why

SELLERS BURNS GAS "INSIDE THE WATER"



The Model 105 Sellers Immersion Steam Boiler is another steam boiler designed and built with totally submerged and horizontally located firing tubes.

This system of firing permits all gas to be burned inside the submerged tubes — and therefore *inside the water.*

Every tube is an individual combustion chamber with its own burner — *completely surrounded by water.* This is the most efficient method ever devised.

And this system permits "spreading out the fire" — to put every square foot of heating surface to work, increasing life, internal circulation, and operating efficiency.

The Sellers Model 105 Immersion Steam Boiler is only one of a complete line — all are companion boilers to the famous Sellers Model 46. Investigate this line — there is one to fit your requirements.

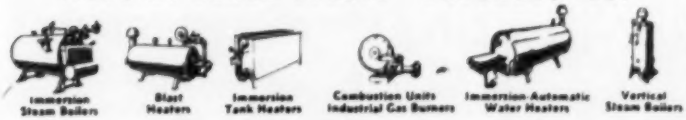
BEFORE YOU BUY ANY STEAM BOILER, CONSIDER THESE FACTS

- ***MINIMUM SCALE PROBLEM***
  Intermittent firing of the boiler brings about alternate expansion and contraction of the firing tubes which loosens scale which might form on the tubes. This scale drops to the bottom of the shell out of the firing zone and cannot bake on to the firing tubes. Clean out openings are provided.
- ***CONTINUED HIGH EFFICIENCY***
  As long as firing tubes are kept clean, original high efficiency is economically maintained.
- ***NO WATERLINE CORROSION***
  With all firing tubes totally submerged, there is no corrosion at the waterline—where tubes normally fail. In Sellers immersion type steam boilers, there can be no waterline corrosion.
- ***MORE EFFECTIVE INSULATION***
  More effective insulation is possible because the insulation is against heat loss from low temperature steam and water instead of a high temperature combustion chamber.
- ***FASTER STEAMING AND DRYER STEAM***
  Rapid steaming and dry steam takes place because of the large surface area of the water. All surface water is heated first since the firing tubes are located close to the water line.

Sellers

ENGINEERING COMPANY

4876 N. CLARK STREET CHICAGO, ILL.



Save Dollars Now!

SELLERS ENGINEERING COMPANY
4876 N. Clark Street
Chicago, Illinois

☐ Please send us complete information on the Sellers 105 Model Steam Boiler.
☐ Send us the Tell-All folder on the Sellers complete line of steam boilers.

Name_____

Company_____

Address_____

City_____ State_____

Dept._____

Equipment & Supplies

E—534. Germanium Rectifiers Have 95 per cent Efficiency—New Germanium Rectifiers developed by Rapid Electric Co., New York, N. Y., offer 95 per cent efficiency at full load.

Ge Rectifier

Available in several models from 300 to 50,000 amperes d-c output, the new rectifiers are designed to out-live all conventional types of d-c power supplies.

In voltage stabilization tests on the new units, a minimum voltage variation of less than ±1 volt has been maintained when operating from no load to full load.

Oil immersed, fully motorized continuously variable, inductor controls are furnished to vary the output from zero to full rated load at the touch of a button. The complete rectifier units are almost 100 per cent completely sealed from adverse atmospheric conditions. The germanium junctions are hermetically sealed. Because the use of elaborate fans and cooling systems has been eliminated, the units are considerably smaller physically than conventional units.

E—535. Filtering Corrosive Solutions—Certain solutions, that must be filtered, present a special corrosion problem. For example, the following electroplating solutions cannot be filtered without causing corrosion of stainless steel equipment: High chloride solutions (all chloride nickel and iron, nickel strike); high chromic acid solutions (hard chrome); fluoboric acid solutions containing chlorides (iron fluoborate); high acid sulfate solutions (acid copper solutions containing over 10 oz/gal sulfuric acid).

Sethco Filter Pumps VHI-5 and VHI-10, rated at 50 and 100 gal/hr respectively, are equipped with Hastelloy C pumps, fittings, rigid unplasticized polyvinylchloride filter assemblies, and meet these exacting requirements.

Hastelloy C Alloy is a nickel, molybdenum, chromium, tungsten, iron alloy. It is the most universally corrosion resistant alloy available today. The rigid pvc filter

Corrosion Resistant

assembly offers complete resistance to any type of plating or electropolishing solution. Consequently, the VHI series are the most all around corrosion resistant filter pumps on the market.

Motors furnished with the VHI series are totally enclosed, ball bearing, 110-volt, 60-cycle, single-phase type.

Pump, filter assembly, and motor are mounted on a corrosion resistant, linen impregnated, phenolic panel with ball bearing, rubber tire casters for easy portability. Each unit comes equipped with 10 foot lengths of chemical inlet and outlet hose. A plastic strainer is furnished with the inlet hose.

THE ANSWER TO YOUR TANK HEATING PROBLEMS

FOR ACID HEATING JOBS

G SERIES
FUSED QUARTZ
IMMERSION HEATERS

Over 40,000 CLEPCO Fused Quartz Heaters now in service.

Dependable, controlled heat at low operating cost.

Wide range of Standard Sizes for every need.

Only Fused Quartz Heater recommended and sold by all leading plating supply houses.

FOR ALKALINE HEATING JOBS

W & WS SERIES
STEEL AND STAINLESS
IMMERSION HEATERS

Specify CLEPCO Non-Magnetic Stainless Steel Heaters for your alkaline electro cleaners and bright copper plating tanks.

Specify CLEPCO Steel Heaters for all other alkaline tanks.

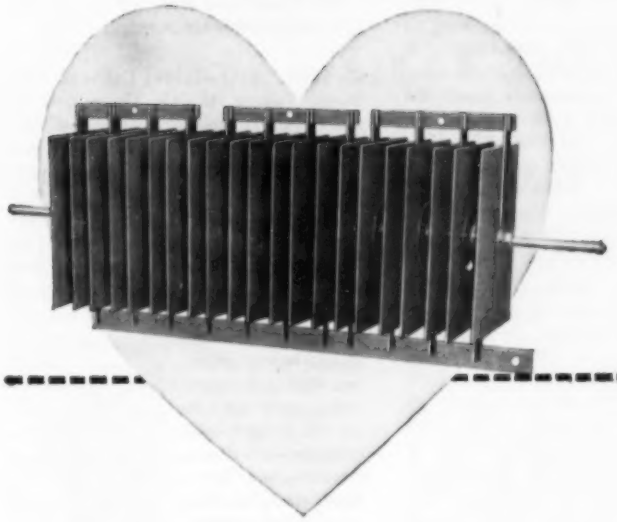
All leading Plating Supply Houses can furnish from stock.

SEE YOUR PLATING SUPPLY HOUSE

Clepco

WRITE US FOR LITERATURE

CLEVELAND PROCESS COMPANY
1965 EAST 57th STREET
CLEVELAND 3, OHIO



Six Square Inches per Ampere* of "Heart"!

See Rapid Selenium Rectifiers and the New Rapid Germanium Rectifiers at Booth 323, 4th Industrial Finishing Exposition, Cleveland, June 20-23.

The selenium stack is the heart of any selenium rectifier. For it is the quality of the stack and its accompanying circuitry that determines the effectiveness of a rectifier, just as the state of the heart and blood vessels of a human determine his strength and health.

IT'S A PROVEN FACT, RAPID RECTIFIER STACKS STAND UP LONGER IN HARD SERVICE. HERE'S WHY:

1) Rapid allows 6 square inches per ampere of plate surface in full wave bridge circuits. For years we have maintained this standard (somewhat higher than other makes), since we feel allowing this much area results in maximum life expectancy.

2) The plates in Rapid stacks use triple purified Selenium.

3) They are carefully tested and balanced for even current distribution.

4) They are coated with an exclusive material rendering them absolutely impervious to the corrosive conditions existing in plating rooms.

5) The plates are spaced an average of ½ inch, diminishing the possibility of dust, dirt and corrosive material becoming lodged between plates, thus allowing heat to dissipate readily.

Rapid designs its stacks to much higher standards than most other manufacturers.**

For example:

In tests performed at ambient temperatures of over 30°C, a recognized electrical manufacturers' group standard allows a temperature rise in the stack of 60°C; and, a rise of 40°C at the same ambient temperature for 1000 hours is permitted without derating.

Rapid standards permit a maximum stack temperature rise of only 22°C above the ambient. This low rise is made possible only because of the large area used per ampere, the plate spacing, high purity of Selenium used, the advanced circuitry and the engineering skill which designs the complete rectifier unit for the specific job.

So, when you buy a rectifier, check its heart. Make sure the one you buy offers the most advanced design for longest life . . . In other words, make sure you get a Rapid Rectifier.

*In forced air cooled, three phase, full wave bridge circuit units.
**All three phase rectifiers are designed with a full wave circuit.

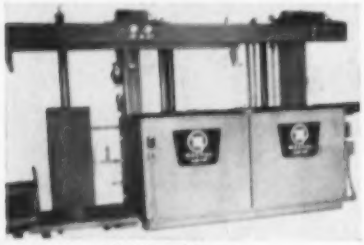
THE NAMEPLATE THAT MEANS *"More Power to You!"*

RAPID ELECTRIC COMPANY

2881 Middletown Road • New York 61, N. Y. • Phone: Talmadge 8-2200

Equipment & Supplies

E—536. Automatic Loading—The Magnus Chemical Company, Inc., inventors and pioneers of the "Aja Lif



It's Now Nu-matic

Automatic" cleaning method, announce a new addition to this unique line of equipment using mechanical agitation of the work in the cleaning solution.

In this new development, the Magnus machine is equipped with "nu-matic push device" and "air lift loading" of the work.

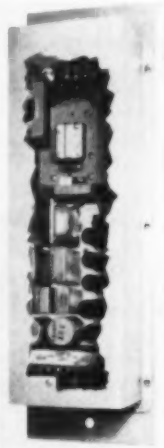
As illustrated in the photo, the work to be processed (generally in baskets), is pushed at floor level on to a lifting roller platform which automatically raises the work to the working level or top of the cleaning machine. At the same time similar roller platforms in each tank raise to the same level. Then a push drive device with collapsible dogs above the tanks transfers each basket or batch of work one step forward at each cycle.

By means of a timing device which synchronizes the "nu-matic push drive" with the "air lift loading," the platforms in each tank with the work on them are lowered in the cleaning solution and vigorously agitated for the necessary length of time, after which the platforms will automatically rise again at working level. At this moment the "nu-matic push drive" will transfer the baskets or loads one more step toward the right and the process repeats itself indefinitely.

The functioning is entirely automatic. The equipment is air powered.

E—537. Transducer Converts d-c Measurement to Air Output—Electrical measurements of such process variables as temperature, speed, power and pH are converted into a proportional 3–15 psi pneumatic output and transmitted to graphic panel receivers by the new EMF/Pneumatic Transmitter manufactured by The Foxboro Company, Foxboro, Mass.

Easily mounted on the back of a control panel, the transmitter receives a millivolt signal from the measuring element (thermocouple, tachometer, etc.), converts it into a proportional 2000 cps a-c voltage, amplifies and filters the signal, and feeds it to a phase detector circuit. The resulting d-c output is passed through a temperature-stable resistor and a transducer winding, connected in series. Current through the resistor provides inverse feedback equal to 99.8 per cent of the input signal, thus minimizing amplifier variations and providing greater stability. Current through the transducer winding provides a magnetic force that positions a flapper-nozzle assembly in the transducer to produce an air relay output proportional to the original d-c measurement. This output is transmitted to an indicator, recorder or controller.



Converter

E—538. Unbreakable Polyethylene Pipette Jars—Lightweight, unbreakable pipette jars, made of high-molecular, weight-virgin polyethylene, are now available from the American Agile Corporation, Bedford, Ohio. The units are chemically resistant to most acids, alkalis, and caustic cleaning solutions at temperatures up to 150° F.

Pipette Protectors

An important feature of the jars is that their resiliency helps prevent breakage of pipettes or pipettetips during soaking or washing operations. A solid polyethylene base is molded to the body of the container to prevent tipping and provide maximum stability.

The jars are available in four sizes with diameters of five and seven inches, and heights ranging from eight inches to 17½ inches.

Extra—at no extra cost

We offer product-quality above the industry standard, the interested attention of owner-managers and heads-up local service by as fine a line-up of distributors any manufacturer can have.

If these "extras" appeal to you, we'd like to have a modest order when you're in the market. We are sure you'll appreciate the quality of BFC Chromic Acid and the nice, friendly way we do business.

BETTER FINISHES & COATINGS, INC.

268 Doremus Ave., Newark 5. N. J.

122 East 7th St., Los Angeles 14, Calif.

Points of Interest in Cleveland

CLEVELAND AIRPORT. Riverside Drive near Brook Park Rd. Eight and one-half miles S. W. of Public Square.

The largest municipally owned airport in the world. Covers 1,000 acres. Approaches well marked with arrows, readily located from the air. Twelve hangars and Administration Building. Regular service or charter planes available for all points. A visit to the Port at night is most interesting when planes may be seen landing and leaving by the light of a 500,000,000 candlepower flood light. Take car marked "Lorain-Rocky River Drive" at Public Square and transfer to airport Motor Coach, or take Beren Motor Bus at Public Square. By motor the best route is West on Superior over High Level Bridge through Edgewater Park to West Boulevard, thence to Bellaire Road to West 130th to Puritas Springs Road, thence to Rocky River Drive to the Airport entrance.

DETROIT-SUPERIOR HIGH LEVEL BRIDGE

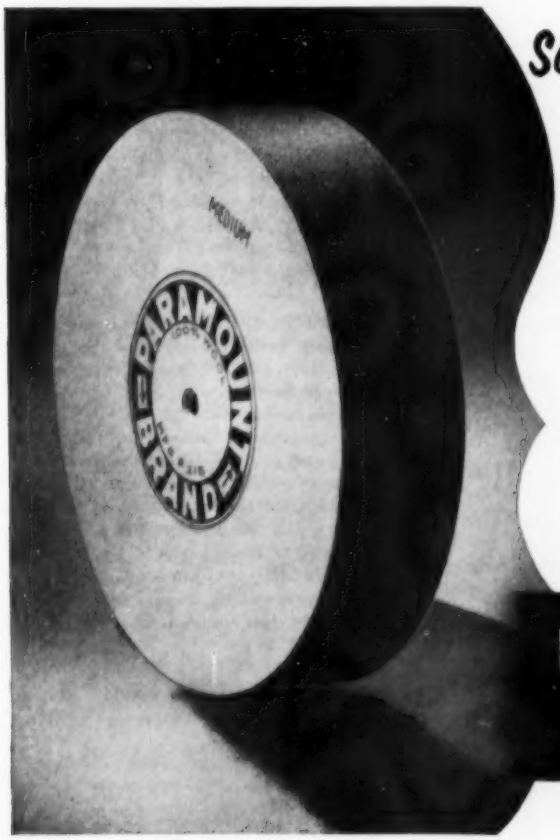
The largest double deck reinforced concrete bridge in the world connects Superior and Detroit Avenues. Its 591 foot center span, 95 feet above the lake level, is of nickel steel. Length of bridge, 2,880 feet, width 81½ feet, cost $5,407,000. The lower level provides space for six street car tracks, while the upper is for vehicles and pedestrians. From the upper level of the bridge may be had a wonderful view of Lake Erie, the breakwater, piers and lighthouses, steam and sailing vessels, from large freighters to little sand barges; blast furnaces, foundries, flour mills and grain elevators.

MUSEUM OF ART. E. Boulevard, in Wade Park near Euclid Avenue, overlooking Fine Arts Garden.

A charming building of Georgia marble, completed in 1916 at approximate cost, including equipment of $1,250,000. The Museum contains interesting collections representing the arts of all ages and countries. Open daily from 9:00 A.M. to 5:00 P.M., except as follows: Wednesday, 9:00 A.M. to 10:00 P.M.; Sunday, 1:00 P.M. to 10:00 P.M. Free days: Sunday, Wednesday, Saturday and Public Holidays. Friday is free from 7:00 to 10:00 P.M., during the lecture season. On other days admission fee is 25 cents except to members, and to children of school age. "East 140th Street," "Euclid Village" to Adelbert Road. (25 minutes)

MUSEUM OF NATURAL HISTORY. 2717 Euclid Avenue.

Admission is free. Contains exhibits of Ohio mammals, birds, insects, and fossils. Visitors will be interested in the lion group, fern group, prairie dog group, the mastodon skeleton and the model of Treasure Island. Week days 9:30 A.M. to



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Points of Interest in Cleveland

5:00 P.M.; Sundays, 2:30 P.M. to 5:30 P.M.; Sunday afternoon lecture courses at 3:30 during winter. Take eastbound Euclid Avenue cars.

NELA PARK.

The beautiful grounds comprising the laboratory headquarters of the National Lamp Works of General Electric Company, located at the head of Nela Avenue in East Cleveland. Visitors are welcome at the "University of Light." Special inspection trips are conducted at 10:00 A.M. and 3:00 P.M. daily, except Saturday afternoons and Sunday. These trips cover interesting sections of the grounds, laboratories and the Nela School of Lighting. Take "East Cleveland" or "Euclid Village" cars on Euclid Avenue to Nela Avenue. (10 minutes)

NEW UNION TERMINAL.

Ranks with the largest in the country, accommodating railroads, rapid transit lines and interurbans. The site embraces approximately thirty-five acres and adjoins the Public Square.

PUBLIC AUDITORIUM. St. Clair Avenue at E. 6th Street and Lakeside Avenue.

The finest and most serviceable municipal auditorium in the United States. Main Auditorium completed in 1922. North and South wings in 1928. Fourteen events can be held simultaneously. Seating capacity of main Auditorium 13,156, Music Hall 3,000 (these may be combined into a total seating capacity of 16,000), Ballroom 1,500, North Exhibition Hall 1,500, Little Theatre 700, several additional halls with seating capacity ranging from 60 to 500. The pipe organ is the second largest in America and contains 10,010 pipes and 150 direct speaking tubes. The echo organ is 300 feet from the console.

PUBLIC LIBRARY. Superior Avenue at E. 3rd Street.

Built of gray Georgia marble at a cost of $5,000,000. The reading rooms are free to all. Week days 9:00 A.M. to 9:30 P.M.; Sundays, 2:00 P.M. to 9:30 P.M.

STADIUM. On Lakefront between W. 3rd Street and E. 3rd Street.

An iron and concrete structure seating 78,000 persons and costing $2,500,000. Completed in July, 1931. Its great outdoor arena is suitable for baseball and football games, boxing exhibitions and other athletic contests, pageants, etc. Within walking distance of all downtown points.

TERMINAL TOWER.

The dominant unit of the Terminal Group is the Terminal Tower which soars to a height of 708 feet above the concourse level. It is a building of classic design with an imposing main entrance fronting on the Public Square. The limestone facade of its square shaped tower is pierced by graceful arches, from the 30th to the 32nd floors, with turrets higher up. It is crowned by a pyramidal headpiece. The observation room on the 42nd floor affords a splendid panoramic view of the city. Binoculars and high-powered telescopes during clear weather bring into view localities 25 miles from the city.

CLEVELAND PARK AND BOULEVARD SYSTEM.

Extends like a girdle around the greater part of the city, has hardly a rival in America. Deep ravines, natural waterfalls, fine old forests and the shore of a great lake, combine to give these grounds rare charm. Twenty parks, with more than 44 miles of well paved driveways and boulevards, comprising 2,875 acres, make up this great system, which contains 29 children's Playgrounds, 50 Baseball Diamonds, 77 Tennis Courts, 25 Skating Ponds, 18 Gridirons, and a sporty 36-hole Golf Course. The more popular parks are:

BROOKSIDE PARK. South Side, 159 acres. Denison Avenue at Fulton Road.

Swimming pool accommodating 1,500 bathers, artificial lake for boating and ice skating, tennis courts, baseball diamonds, a natural amphitheatre or stadium, capacity 150,000 people; picnic grounds, refreshment booths, children's playgrounds, Zoological Garden. Car at northwest corner of Public Square marked "Fulton Road—Brookside Park" to north entrance of park, or any car at southwest corner of Public Square marked "West 25th," to south entrance of south end of Brooklyn-Brighton Bridge.

EDGEWATER PARK. West Side, 117 acres, 6,000 feet frontage on Lake Erie.

Contains expansive lawns, shady walks and driveways, athletic grounds, beautiful bathing pavilion and beach, outboard motor boating. Car marked "Clifton" at northwest corner of Public Square, or double-deck motor coach marked "Clifton-West 117th," at northwest corner of Public Square.

EUCLID BEACH PARK (Private ownership, 150 acres). Upon the shore of Lake Erie, 8½ miles east of the Public Square.

One of the best known recreation parks in the world. No entrance fee. Parking free. Unusually complete camp for automobile tourists. Take car marked "Euclid Beach" going east on St. Clair Avenue to park. (45 minutes)

FINE ARTS GARDEN. An extension of Wade Park, located between Euclid Avenue and the Museum of Art.

Fountain of Waters, marble terraces and stairways, the 12 signs of the Zodiac, drinking fountains and other statuary. All donated by Cleveland citizens. Take eastbound car on Euclid Avenue except "Cedar" to E. 107th Street. (25 minutes)

GORDON PARK. East Side, 113 acres. On shore of Lake Erie.

Expansive lawns, shady woods, athletic fields, boating, bathing beach, refreshment booths, outboard motor boating. Any car going east on St. Clair, Superior, Payne or Euclid Avenues. Transfer at E. 79th Street to cars going north to park entrance. (25 minutes)

LIBERTY ROW. An avenue of red oaks, dedicated May 30, 1919 to memory of 835 Cleveland boys who gave their lives in the World War.

Extends for 9 miles from Lake Erie at Gordon Park along the parkways out over Shaker Heights.

METROPOLITAN PARK.

A belt of parks and parkways about the city's three landward sides. In general, it follows the Chagrin River on the eastern side of the Metropolitan area. Tinker's and Chippewa Creeks on the south and Rocky River on the west. Present total acreage is about 10,000.

ROCKEFELLER PARK. East Side, 280 acres. Connects Wade Park and Gordon Park.

This picturesque ravine, through which flows Doan Brook, the gift of John D. Rockefeller, has been converted by the city into one of Cleveland's play spots. Cars going east on Superior between Public Square and E. 13th Street marked "Payne Avenue" to E. 105th Street.

SHAKESPEARE GARDEN. Upon the upper (east) driveway to Rockefeller Parkway, north of Superior Avenue, near North Boulevard.

This garden, similar in plan to the English gardens of Shakespeare's time, was dedicated in April, 1916 as a tercentenary commemoration of the death of Shakespeare. Interesting features of this garden: a bust of Shakespeare; a sun dial, the gift of Robert Mantell; a mulberry tree, a cutting from one planted by Shakespeare at his home; roses and vines from the traditional tomb of Juliet at Vernon, Italy.

WOODLAND HILLS PARK. Kinsman Road, E. 102nd Street to E. 116th Street. 113 acres.

Recreation grounds and the second largest swimming pool in the U. S., with public bath house. Take Kinsman car at Prospect and E. 4th Street.

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CANCER SOCIETY

CONVENTION NEWS FROM MFSA

This year, as always, Metal Finishing Suppliers' Association is indebted to the Convention Committee for the privilege and pleasure of entertaining its old friends and its new.

MFSA is a growing and increasingly active trade association; but it nonetheless enjoys the conviction that in one respect it travels in a rut. The Tires of its V-8s are trailing the well-greased wheels of the prairie schooners—the old International Fellowship Club, which was founded and sustained to bear conviviality into the technical gatherings of the early AES.

Manson Glover

Open House. On Monday evening formal welcome will be extended to all Conventioneers and their families in the lovely terraced ballroom of the Hotel Carter. Your registration-book ticket will admit you to dancing from nine o'clock, a buffet spread at ten-thirty, light beverages for all tastes, and throughout the evening a happy reunion for old-timers and an auspicious introduction for newcomers to AES. The President-Elect of the Association will preside, and holders of the Lucky Numbers will find themselves moderately enriched.

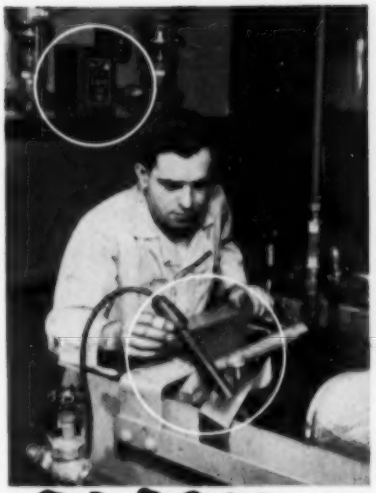
Trustees' Meeting. The regular meeting of the Board of Trustees is called for 2:00 P.M. Sunday, June 19, at the Carter. All chairmen of standing committees and sub-committees are warmly invited. The meeting will set up final agenda for the Annual Meeting of the Association.

MFSA Breakfast and Annual Meeting. Exposition hours include Monday afternoon, and Tuesday morning is free. On that account the Annual Meeting of the corporation will be held in connection with a breakfast for all suppliers at the Hollenden, on Tuesday at nine o'clock. The gavel will descend at 9:45 and the agenda will be handled as promptly as possible, both to honor the twelve-o'clock opening hour of the exposition doors and to release for golf (see below) the less responsible of the membership.

Golf Tournament. Vice-President G. Sarazen Duffy informs us that Golf Chairman Bob Renton and his assistant Bob Burford have selected for the MFSA Tournament the Sleepy Hollow Country Club, which lies conveniently for private cars on a freeway directly south of downtown Cleveland.

* * *

Happy Days are Here Again—even for Republicans. SEE YOU IN CLEVELAND!



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Installation comprises (a) Conductivity Cell placed in rinse tank; (b) Solu Bridge Controller automatically actuating (c) Solenoid Valve, for any preset degree of rinse.

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Remember, Haveg is not a coating or tank lining. It is a moldable rigid, plastic material made from acid-digested asbestos and specially selected synthetic resins. Throughout its entire mass, Haveg is resistant to most acids and salts, chlorine, practically all solutions used for finishing metals.

Haveg can help you make your finishing operations more profitable and less subject to the waste of corrosion. Call the sales engineer listed and write for 64-page Bulletin F-6 which shows tank sizes, shapes, chemical ratings . . . the complete Haveg story.

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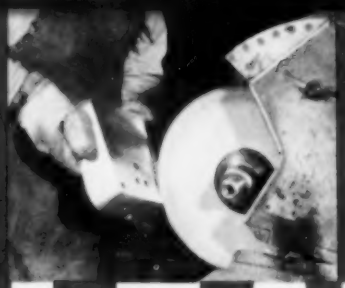

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● **LEA COMPOUND** is industry's pioneering *greaseless* composition. Introduced in the 20's, it's the leader today and is available in many kinds and sizes of abrasive grains. It's the ideal composition for producing satin finishes or for flexible polishing and burring on stainless as well as silver, brass, aluminum and other non-ferrous products.

● **LEAROK** complements LEA Compound. It's industry's pioneering and today's leading "no-free-grease" composition. With no tendency to pack, therefore clean, it long ago proved a boon to plants finishing articles with crevices and contours.

● **LEA LIQUABRADE** . . . a post-war development by the Lea Technical Staff, is fast establishing its superiority and preference in many plants, particularly where production line automatic methods of finishing are set up. Stable, non-settling, completely non-flammable and non-explosive, it is being bought by many large companies in trailer lots. Like the other Lea compositions, LIQUABRADE comes in a wide variety of types and sizes of abrasive grains.

While this particular message is on these three outstanding Lea Finishing Compositions, don't forget Lea Technical Service. We're at your service in connection with any surface finishing problem you may have. We have complete laboratory facilities to do any necessary test work. We can help correct wrong methods now being used and help start you out right on new products.

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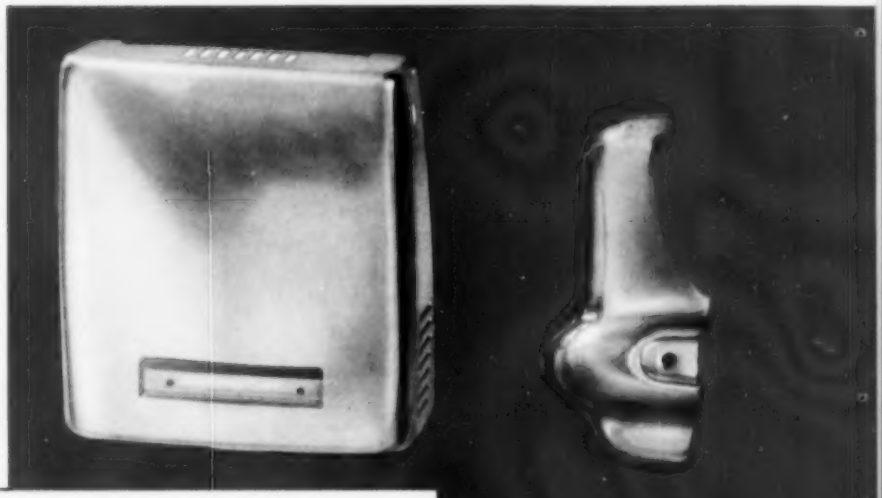

Here are some of the Lea-Ronal Bright Nickel advantages:

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- . . . has high throwing and covering power regardless of brightness desired.
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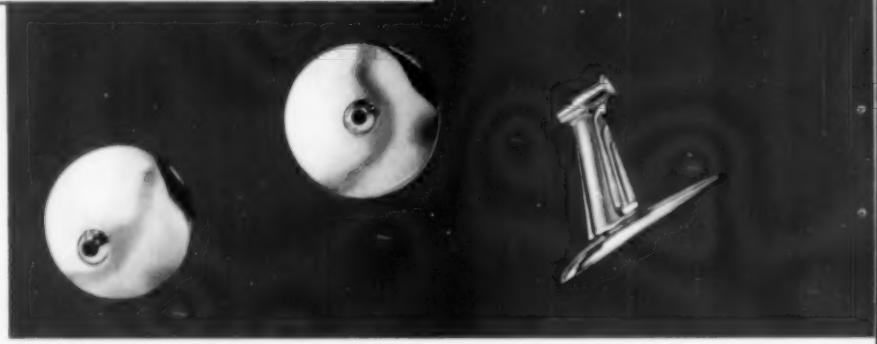

You can easily convert your present nickel plating methods to the Lea-Ronal Bright Nickel Process, using Lea-Ronal Nickel Gleam Addition Agents as brighteners. Our process serves equally well for either still tank or barrel plating.

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REPORTS from all over

. . . stripped, cleaned and degreased

(This section is especially compiled for the readers of PLATING; here the world in which we work and operate is stripped of its veneer, cleansed of its distortions and carefully degreased of superfluities).

1955 will turn out to be the biggest year on record when all the totals are in. . . . Business activity will continue to move up until vacation time brings the usual letdown. . . . Plant and equipment spending has turned upward, reversing an eighteen month decline. Total will exceed $26.8 billion—last year's figure. . . . It looks as though four millions cars will be made during the first half alone. Sales estimates for the whole year range between 5.5 and 6.4 million.

METALS—*Titanium Metals Corp.*, through better efficiency and sustained capacity operation, were able to cut sponge prices of titanium by 55 cents. *DuPont* followed. . . . Stability of zinc prices is due largely to the threat of aluminum as a substitute. . . . Copper, at 36 cents, is forcing some consumers to economize and switch to aluminum. Copper should hold the high price level until at least the third quarter of 1955. Consumer realization of full capacity production plus better availability should then begin to break the high price.

Quotations on all metals stand:

ALUMINUM—(99 per cent pure plus ingot)	23.200
ANTIMONY—Five tons or more but less than carload	31.970
Bulk	28.500
In cases (Port Laredo)	29.000
CADMIUM—Producers' quotation	170.000
Producers' and platers' quotation	170.000
Platers' quotation	170.000
COPPER—Electrolytic, domestic	32.935
Electrolytic, export	37.314
GOLD—(per ounce U. S. price)	$35.000
LEAD—Common, New York	15.000
Common, St. Louis	14.800
MAGNESIUM—(ingot)	27.556
MERCURY—(per 76 lb flask)	$321.556
NICKEL—(F.O.B. Port Colborne U. S. duty included)	64.500
PLATINUM—(refined per oz)	$78.500
SILVER—New York, per/ounce	87.250
London, pence/oz	75.902
TIN—New York	91.106
New York, 99 per cent min	90.106
ZINC—Prime Western (E St. L.)	11.500
Prime Western (delivered)	12.000

BUILDINGS and METHODS—Tomorrow's factories will be smaller but will produce more. One-story buildings will prevail because automation requires horizontal production lines. This year US industry will spend about $27.1 billion for new plants and equipment. . . . *International Nickel* claims it has operating, at its Bayonne, N. J., research lab, the world's only fully automatic pilot plating plant. It allows testing of new methods and coatings under conditions similar to those found in industrial plants. It also announced two welding electrodes and nionel, a versatile high-nickel alloy capable of resisting corrosive attack by many hot acids and mixes of acids.

WATER TREATMENT—*National Aluminate* claims a strongly basic anion exchange resin successfully removes oxygen from distilled or deionized water by regenerating the resin bed with sodium sulfite. . . . The dyestuff kernechrot (nuclear fast red) quickly distinguishes between tap and distilled water by a color change produced by small variations in calcium. . . . New British water treatment process: the sodium silicate was modified by using sodium bicarbonate, dispensing with the need for concentrated hydrochloric.

PLATING—*J. Mohler*, in the March issue of *Machine Design*, gives design specs for chromium plating thicknesses.

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Porosity Of Nickel Deposits By Autoradiographic Techniques*

Russell H. Wolff, Mary Ann Henderson and Stanley L. Eisler†

ABSTRACT

A method is described for determining the porosity of nickel deposits by plating the nickel over an electrodeposit containing radioactive iron. The nickel films are then evaluated for discontinuities by use of photographic film suitably exposed to radiation emanating through the nickel plate from the iron. A number of nickel baths were included in the investigation and the autoradiographs obtained were compared with the corrosive effects developed by means of a boil test. The method suggests a new approach to porosity studies that is representative of usual plating conditions.

INTRODUCTION

Corrosion prevention of metals by deposition of additional metallic films is accomplished generally by two methods: use of a metal that is less noble than the basis metal; or use of a metal that is more noble than the basis metal. The choice depends upon the nature of the object being coated and the type of service expected. Where maximum protection is desired with secondary emphasis on ornamental appearance, the less noble, anodic coatings are usually chosen. Such coatings protect in a sacrificial manner with the corrosion proceeding at the expense of the protecting film. Cracks or minute holes in the coating are usually not serious problems with this type of protection, since the coatings tend to anodically protect or heal over such deficiencies with corrosion products.

In the case of highly polished ornamental films, or where chemical or wear resistance is required, the more noble metallic films are generally deposited. With such films, any discontinuities become focal points for corrosive attack on the less noble basis metal. The corrosion of the basis metal in this fashion is very undesirable. The extremely localized cell action causes pits in the base metal, blistering and lifting of the coating.

The porous nature of electrodeposited coatings has long been recognized in the field of electroplating. The problem has had particular emphasis in the plating of nickel, which until only recently had been the most readily available and most practical of the more noble metals. Nickel is especially important since it has been found to be the actual protecting barrier in the copper, nickel, chromium system.[1,2]

The importance of porosity in electroplating may be recognized by reference to the excellent and thorough bibliography and literature review prepared by Thon and Addison.[3,4] Having recognized the fact of porosity, the problem

*The opinions or assertions herein are not to be construed as being official or reflecting the views of the Department of Army.

†Ordnance Corps, Rock Island Arsenal, Rock Island, Illinois.

resolves into one of precise determination of discontinuities and correlation of the latter to observed corrosion behavior.

The conclusion that electrodeposits are discontinuous by nature stems from early experiments[5] in measuring film thicknesses of electrodeposited metals necessary to suppress the electromotive properties of the base metal. Porosity, if defined as microscopic channels through a coating to the basis metal, could be a result of electrolytic deposition around a passive point and is most pronounced in very thin films.

This inherent porosity is further complicated as shown by Hothersall and Hammond[6] by any one or all of the following causes: (1) a slow and uneven rate of deposition due to "active centers" on the basis metal; (2) the presence of nonconducting or poorly conducting areas on the surface of the basis metal; (3) loose particles on the cathode surface or electrophoretic particles suspended in the solution; (4) gas bubbles adhering to the cathode surface, and (5) surface roughness, resulting in uneven conditions of current density and deposit.

Regardless of the origin of the porosity, a suitable method must be used for its determination. Methods may be either designed to detect individual pores, or intended to measure total porosity. The three most generally used test methods are the "ferroxyl" reagent, the main ingredient of which is potassium ferricyanide, the salt spray test, and the hot water test. More recent methods are the photographic and gaseous diffusion tests.

All of the methods devised will detect the presence of pores; however each has disadvantages. In the case of the ferroxyl test, it has been found that the ferroxyl reagent is actually corrosive to the film and will create pores where none exist. This is also true of the salt spray test which, in addition, takes a much longer time to accomplish. With any of the tests in which films are "peeled" from the basis metal for photographic tests or transmission of light or gas there is always the possibility of induced pores. Such coating foils are dependent on nonadherence to a basis metal for their existence. Thus there is some doubt that the pore structure would be the same for an adherent deposit.

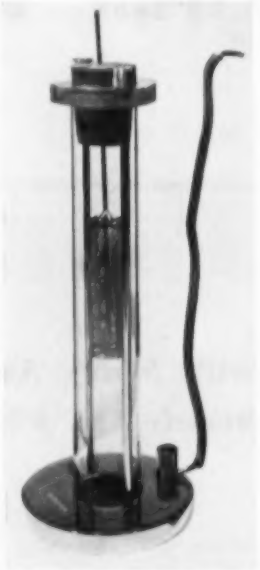

Fig. 1
Cell Used for Plating Radio Iron

The work of Thon[7] and his associates on the porosity project for the American Electroplaters' Society culminated in a gas permeability method for the study of porosity in foils. An extensive study carried on by Ogburn and Benderly[8] using the permeability apparatus designed by Thon has proven the method to be unsatisfactory for porosity determinations. Primary difficulties are: "gross pores" which give diffusion rates not truly representative of the foil; the small size of the area evaluted requires a statistical treatment over many tests and the equipment is extremely sensitive to leaks or other mechanical failures of the system.

As an outgrowth of the permeability work, Ogburn and Benderly developed a photographic procedure. Using a foil and photographic film exposed to light from a photographic contact printer, a pinhole camera effect was observed at pores in the foil. The photographic method actually provided a better test result than the gas permeability method. In general the photographic method will only show gross pores that are normal to the plane of the film. A pore that pursues an angular path through a thick foil may not be detected by the light rays.

At this stage of the work it was suggested[9] that this laboratory consider the application of radioisotopes as a possible method. Some thought was given to the problem to evolve a technique that would be relatively simple, and yet produce the desired radiation through a nickel coating. Previous suggestions for the use of radioactive nickel plate were discarded as an illogical approach. Radioactive nickel would not provide a satisfactory picture of discontinuities below the coating surface. It was believed that a method more likely to succeed would be one using a layer of radioactive iron plated on a specimen* and then overplated with the film of nickel to be evaluated. Radioiron was chosen due to the similarity to the steel specimen, and the fact that the type of x-radiation emanated was suitable for the production of autoradiographs. This article covers the results of the investigation as applied to several types of nickel plated coatings.

MATERIALS EMPLOYED

The coupons used in this investigation were circular discs made of SAE 1020 steel, approximately one inch in diameter and 1/16 inch thick. The coupons were surface ground to provide a smooth base surface on which to plate the radio-iron. Prior to the iron plating operation, each coupon was degreased in a trichloroethylene vapor degreaser, anodically cleaned in an alkaline derusting bath, rinsed in running tap water and air blown until dry.

The iron plating solution used was an alkaline bath containing the following constituents combined in this order:

20 g of iron (50 g ferric chloride) ($FeCl_3 \cdot 6H_2O$) plus 40 g ferric sulfate ($Fe_2(SO_4)_3$) dissolved in a small amount of distilled water;
154 g triethanolamine
132 g tetra sodium salt of ethylenediamine tetraacetic acid
100 g sodium hydroxide
water to make one liter of solution

The radioiron used in this study was purchased from the Oak Ridge National Laboratory by authorization of the U. S. Atomic Energy Commission, Isotopes Division, as a mixture of Fe^{55} and Fe^{59} in HCl. The radioiron in a 0.1M solution of ferric chloride ($FeCl_3$) consisted mainly of Fe^{55} which has a half life of 2.91 years. After a decay period of almost two years, the remaining Fe^{59} which has a half life of 45 days, was considered negligible. The Fe^{55} was considered preferable for the production of autoradiographs due to the weak x-radiation given off as a result of the K-capture process. A sufficient amount of the tagged ferric chloride ($FeCl_3$) solution was added to provide an activity level of approximately 0.05 microcurie of Fe^{55} per ml of plating solution. Later, it was established that an increased activity was desirable in order to reduce the exposure time required for the autoradiographs. Therefore, the activity was increased to approximately 0.20 microcurie of Fe^{55}/ml of plating solution for the later series of tests.

PREPARATION OF IRON PLATED COUPONS

The electroplating cell employed for the iron plating was

*To the reviewers' comments at this point, the authors answered: "Since most steel as used for electroplating metal is rolled from rimmed ingots and the surface is pure iron, it is felt that the uniform basis of any electroplating radioiron is sufficient at present to offset the difference in structure."—Ed.

designed to facilitate the mounting of discs or coupons for plating of radioactive isotopes and to provide a uniform plated area (¾ inch diameter) for accurate radioactivity determinations. (See Fig. 1.) The previously cleaned coupon was sealed on the bottom of the cell by means of a rubber gasket upon which the glass cylinder was held tightly by means of the upper cell assembly, thus assuring a leakproof assembly. The cathode connection for the cell was through the terminal on the metal base. A ½ inch diameter platinum gauze anode was suspended approximately 2½ inches from the surface of the coupon.

A fresh 50-ml aliquot of the iron plating solution to which had been added the proper amount of radioactive ferric chloride was used for each group of six coupons. Approximately 40-ml of the 50-ml aliquot were used to plate the first coupon and the remaining 10-ml were used to maintain the volume of the bath during the subsequent plating operations. Each coupon was plated for 15 minutes at a current density of 40 amp/sq ft and the temperature was maintained at 190–200° F by means of a water bath.

After plating, the solution was poured from the cell and the entire assembly was rinsed with running tap water. The cell was then disassembled; the coupon removed, rinsed again and air blown until dry.

Each coupon was counted immediately after plating using a TGC-3 Geiger Müller tube and scaler unit to determine the reproducibility of the plating process as regards the activity level. These determinations also served to indicate when the bath was becoming depleted in the radioiron constituent.[8] In addition, random coupons were used for the preparation of autoradiographs to verify the uniformity of the radioiron deposit.

NICKEL PLATING SOLUTIONS

Five different nickel plating solutions were included in the work. They represent three types of baths: (1) the chemical reduction or "electroless" method, (2) the conventional Watts bath with and without a proprietary brightening agent, and (3) the phosphorous nickel bath formulated by Brenner, Couch and Williams.[10]

The proprietary solution was prepared according to the directions supplied by the manufacturer. The high *p*H Watts bath was purposely not purified in order to promote poor conditions for plating.

PLATING OF NICKEL FILMS

The specimens were racked four at a time, two with radioactive iron plate and two of plain steel. Three such sets of four coupons were prepared for each plating solution and plated as nearly as possible to thicknesses of 0.2 mil, 0.4 mil, and 0.6 mil, respectively. No intermediate treatment was used between the radioiron and nickel plating operations. The coupons were rinsed with warm running tap water, followed by cold distilled water and then dried by compressed air blast. One liter of solution was prepared for each bath and separate bagged anodes were provided. Thickness measurements were made on specimens plated under identical test conditions for each of the different solutions. Plate

POROSITY OF NICKEL DEPOSIT BATH COMPOSITIONS ARE TABULATED BELOW

	Electroless Nickel (Brenner)		Electroless Nickel (Proprietary)		Watts Nickel		Proprietary Bright Nickel		Low *p*H Phosphorous Nickel	
	g/l	oz/gal	g/l	oz/gal	g/l	oz/gal	g/l	oz/gal	g/l	oz/gal
$NiSO_4 \cdot 6H_2O$ (single nickel salt)	30	4	—	—	240	32	300	40	150	20
$NiCl \cdot 6H_2O$ (nickel chloride)	—	—	—	—	45	6	60	8	45	6
$NaH_2PO_2 \cdot H_2O$ (sodium hypophosphite)	10	1.3	—	—	—	—	—	—	—	—
$NaC_2H_3O_2$ (sodium acetate)	10	1.3	—	—	—	—	—	—	—	—
H_3BO_3 (boric acid)	—	—	—	—	30	4	37.5	5	—	—
H_3PO_4 (phosphoric acid)	—	—	—	—	—	—	—	—	50	6.7
H_3PO_3 (phosphorous acid)	—	—	—	—	—	—	—	—	40	5.4
*p*H range	4–6				4.5–5.5		3.5–4.8		0.5–1.0	
Temperature ° F	195		208		110		120		180	
Current density amps/sq ft					50		50		170	
special treatment	none		none		none		purify, filter, bright agents		none	

thicknesses were held as closely as possible to the above thickness categories.

PREPARATION OF AUTORADIOGRAPHS

The action of ionizing radiation on photographic emulsions is similar to that of light since the silver bromide crystals are rendered developable after absorption of sufficient energy. Since this is true, it is possible to prepare autoradiographs from the radiations emitted by radioisotopes such as Fe^{55} used for this investigation.

The simplest technique of autoradiography was employed for these tests. This involved placing the plated coupon in intimate contact with the film for a predetermined exposure time in the absence of light or other ionizing radiation. Since this method is nondestructive, the same coupons were employed for a number of preliminary tests designed to determine the most satisfactory type of film as well as the optimum exposure time. The criterion of evaluation was based upon obtaining autoradiographs of sufficient density and maximum contrast. It was also considered desirable to select conditions of film type and exposure time which would produce a minimum of fogging in the developed film.

The types of film employed in the preliminary work included: double emulsion dental x-ray, single emulsion dental x-ray, commercial orthochromatic, type K x-ray, and type A x-ray. Of these films, commercial orthochromatic produced very poor resolution and was extremely sensitive to pressure fogging, single emulsion dental x-ray required extremely long exposure periods and type K x-ray produced considerable background fogging. Double emulsion dental x-ray film and type A x-ray film both produced good autoradiographs. Type A x-ray film was finally selected because it gave the desired results and required a shorter exposure period than the double emulsion dental x-ray film.

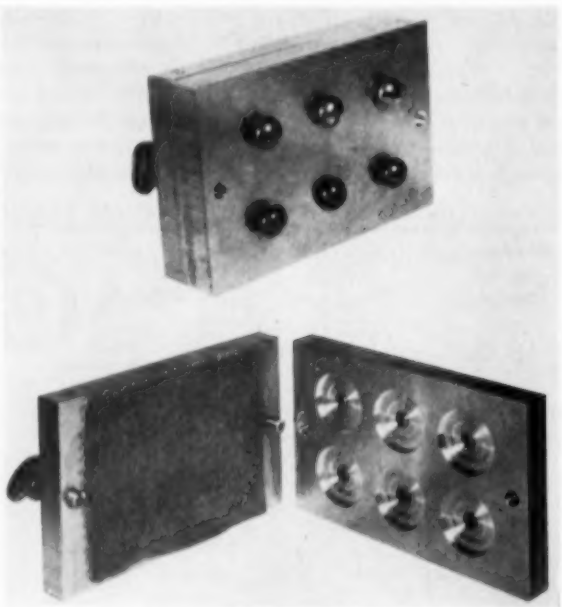

Fig. 2
Film Cassettes for Making Autoradiographs

The desired exposure time was then established by using type A x-ray film for a series of exposures employing varying periods of time and coupons plated with varying thicknesses of nickel. The results of these exposure tests revealed the following exposure time requirements:

Nickel Thickness in mils	Exposure time
0.2	4 days
0.4	6 days
0.6	11 days

These exposure periods were found to produce autoradiographs of comparable density for the various thicknesses of nickel plate.

The processing of the film after exposure was conducted as follows: the film was removed from the holder, developed in Eastman's x-ray liquid developer for a period of four minutes at 68° F, rinsed approximately 30 seconds, placed in Eastman's x-ray liquid fixer for about 15 minutes, rinsed in running water for 15–20 minutes and then dried in a warm air dryer.

To facilitate the comparison of nickel plate plated from various nickel baths, cassettes holding six coupons each were constructed from aluminum to hold the film and six coupons in intimate contact during the exposure period. (See Fig. 2.) The coupons were placed in shallow circular depressions in the bottom half of the cassette and the film placed over the coupons. The felt-backed top of the cassette was then secured on top of the film and coupon by screws. Sufficient pressure was used to insure close contact of the film and coupon and to avoid any movement of the film during the exposure time. The film and coupons were indexed to indicate the position of the film in relation to the top of the coupons.

It will be noted that individual leveling screws are provided for each of the six positions so that any variation in thickness between coupons may be compensated for by adjustment of these screws.

BOIL TEST

At the conclusion of the autoradiographic procedure all coupons were subjected to a boil test. The boil test used in this work is a coating continuity determination described in Military Specification MIL-C-12968 Coatings, Phosphate, Protective for Iron and Steel. Each coupon was placed in a 250-ml beaker and covered with approximately 100 ml of aerated water at room temperature. The aerated water is prepared by bubbling clean compressed air through a reservoir of distilled water by means of a glass diffusion disc for at least 24 hours. The immersed specimen was heated at a rate such that the water began to boil not less than 15 minutes nor more than 20 minutes after initial application of heat. The test was continued at boiling temperature until a total of 30 minutes elapsed from the beginning of the test. The specimen was then removed from the water, dried by air and examined. The *p*H of the water was 6.7.

RESULTS

The following definitions were arbitrarily assigned to the terms to avoid confusion regarding the types of discontinuities:

Pore—A microscopic channel leading from the surface of the coating to the base metal.

Pit—A surface crater or depression.

Inclusion—A suspended particle enclosed within or embedded on the surface of the coating.

Void—A gas bubble enclosed within the coating.

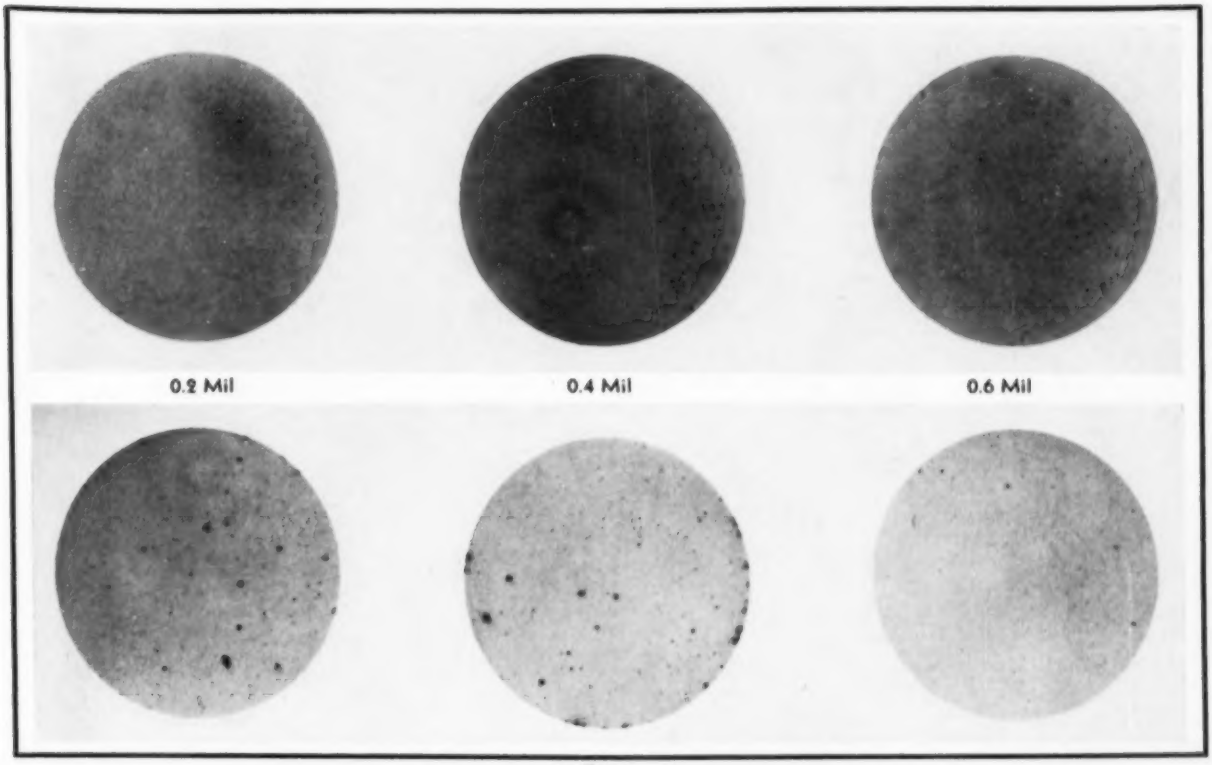

Fig. 3
Autoradiographs A—Top row—and Corresponding Boil Test Results
B—Bottom row—High pH Watts Bath

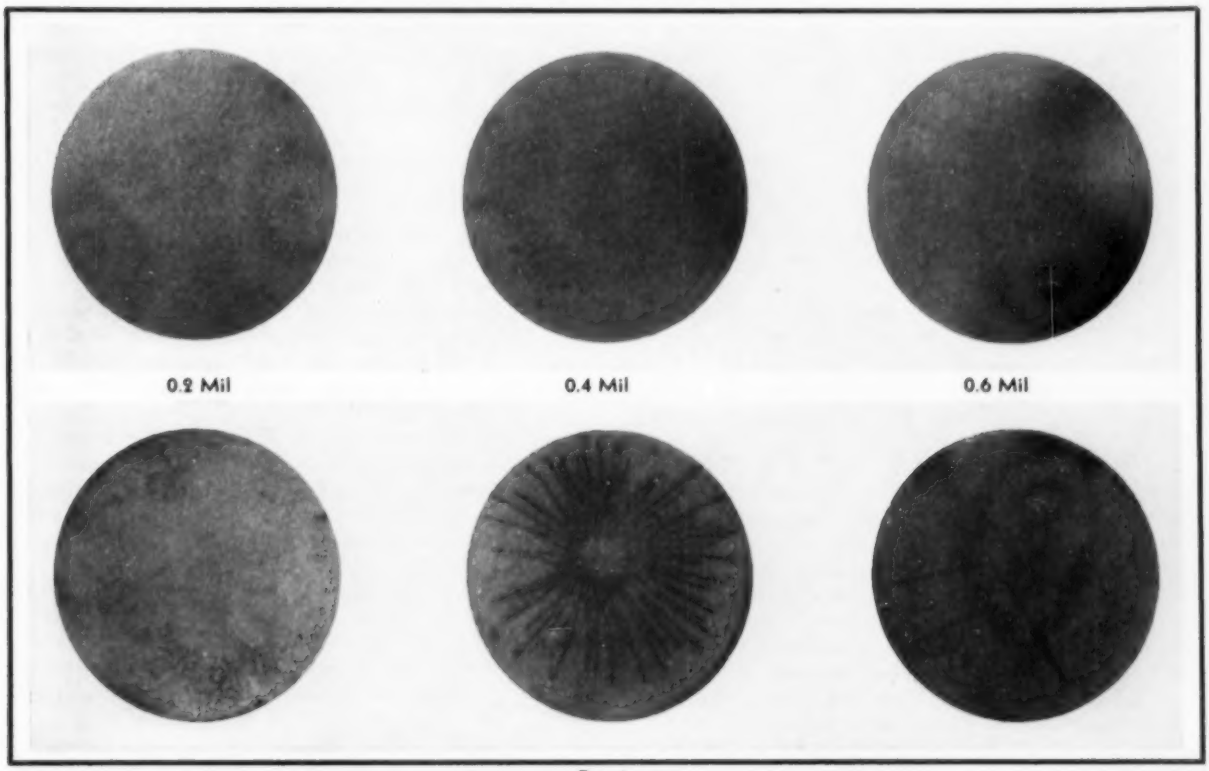

Fig. 4
Autoradiographs A—Top row—and Corresponding Boil Test Results
B—Bottom row—Low pH Phosphorus-Nickel Bath

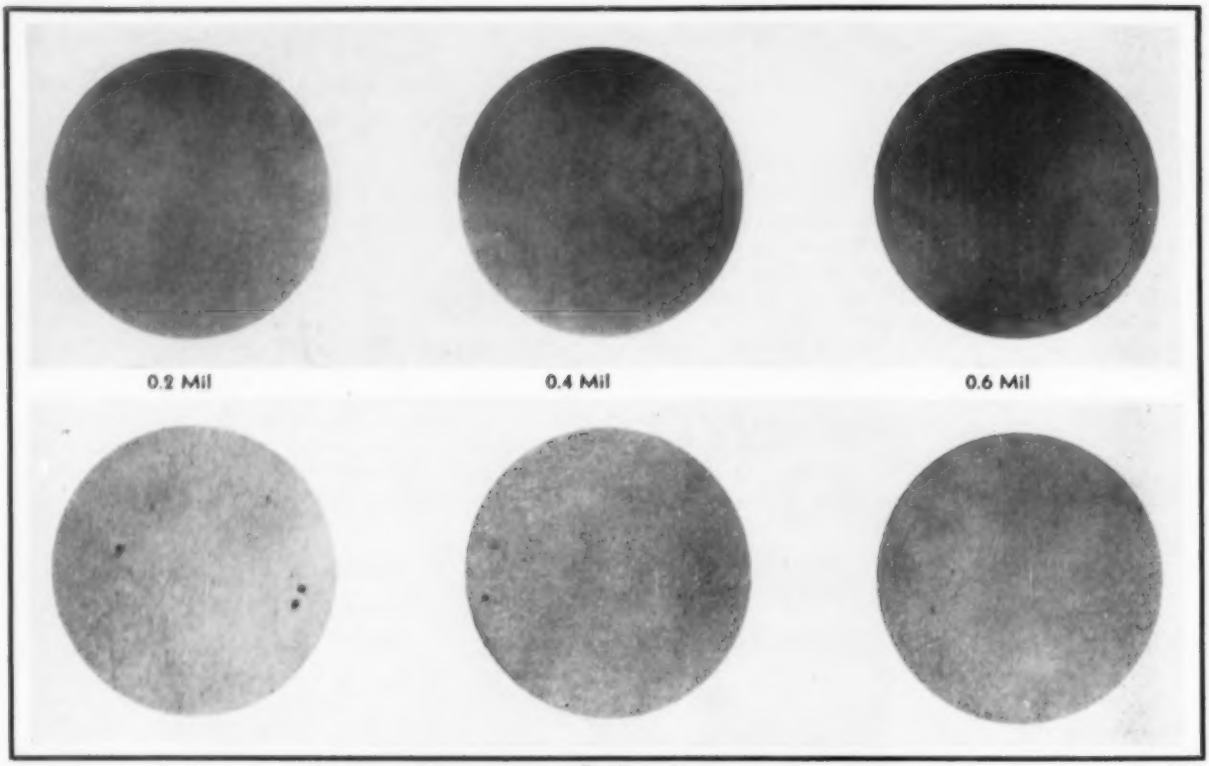

Fig. 5
Autoradiographs A—Top row—and Corresponding Boil Test Results
B—Bottom row—Proprietary Bright Nickel Process

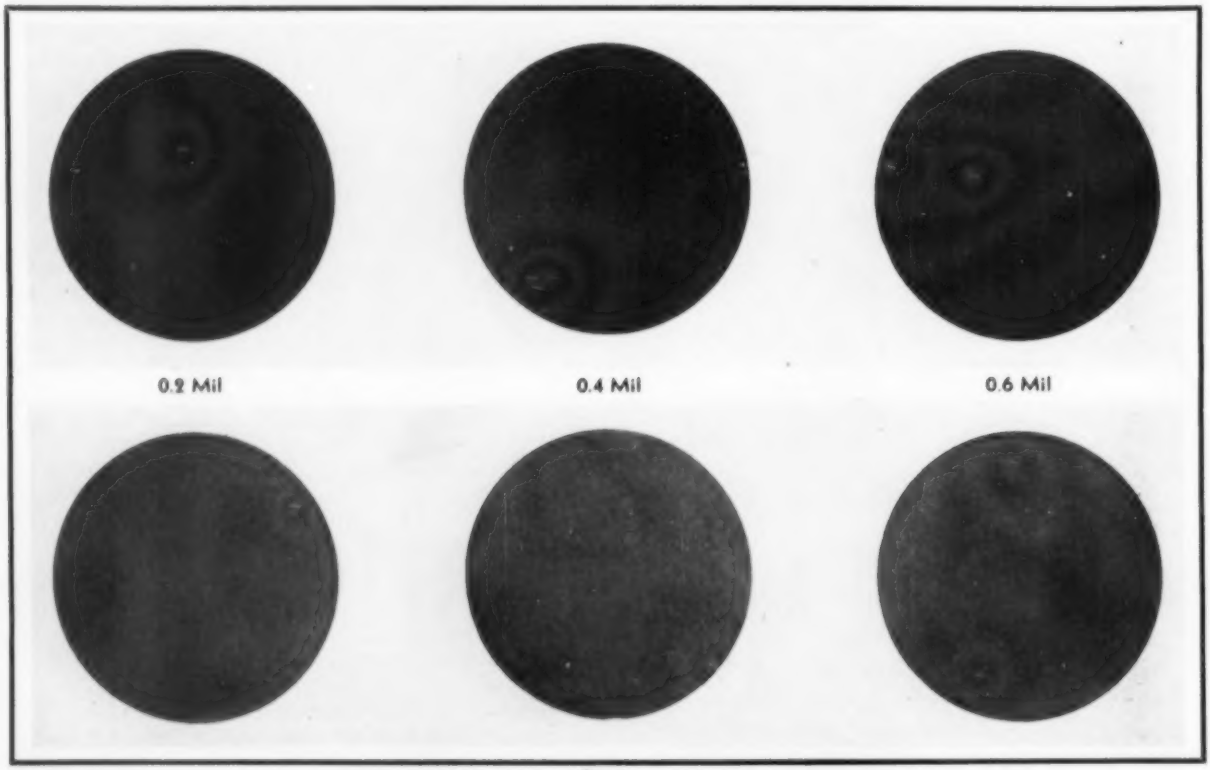

Fig. 6
Autoradiographs A—Top row—and Corresponding Boil Test Results
B—Bottom row—Electroless Nickel Process (Brenner)

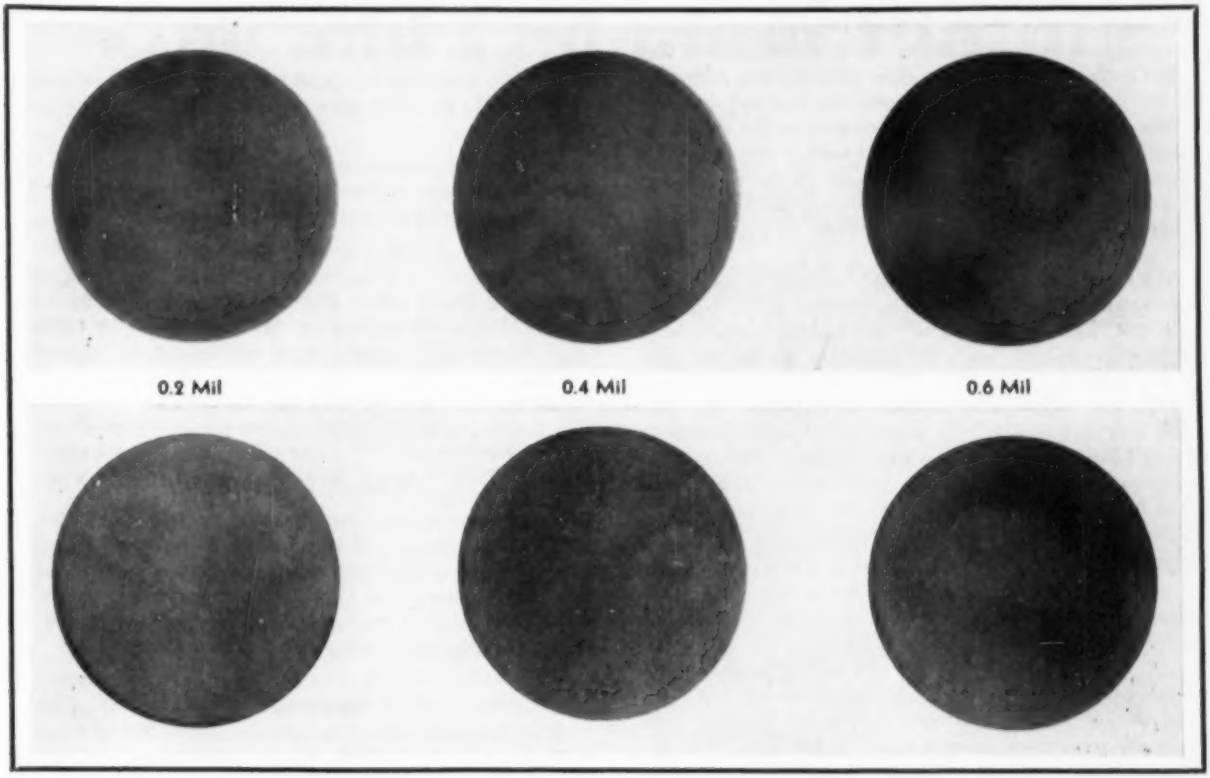

Fig. 7
Autoradiographs A—Top row—and Corresponding Boil Test Results
B—Bottom row—Proprietary Electroless Nickel Process

For further clarification, the term autoradiograph is used in this report since it is believed descriptive of the situation wherein the source of radiation is an integral and inseparable part of the test piece.

Preliminary examination of the autoradiographs, Figs. 3a to 7a inclusive, was undertaken with some misgivings since interpretation of x-rays is seldom accomplished without careful study. This is further complicated by the fact that the autoradiographs reproduced here have undergone several photographic processes with a consequent loss of some definition. The transfer from the original autoradiographs to commercial film by photographic enlargement is also subject to dust and scratch marks that are difficult to exclude even with extreme care. Best evaluations may be obtained by direct examination of the original autoradiographs.

A general survey of Figs. 3a through 7a inclusive will reveal a sufficient variation in the autoradiograph appearances to indicate differences in the nickel plate. A comparison of the autoradiographs and boil test results of this work indicates a general trend. With increasing film thickness the boil test spots decrease in number which is expected as the gross porosity decreases. The autoradiographs show a general increase in number of spots with thicker film, suggesting pits and voids as well as the gross pores. Evaluation of the figures indicates the coatings produced for this test may be rated in order of increasing porosity as follows:

(a) Proprietary electroless process
(b) Electroless process (Brenner)
(c) Proprietary bright metal
(d) Low *p*H phosphorous nickel
(e) Watts nickel (unpurified and unfiltered)

The electroless type coatings were very good in external appearance and compared very favorably with the electrodeposited films. Their autoradiographs (Figs. 6a, 7a) were of uniform density and quite clear of spots indicative of defects in the coating. Next in order of quality was the proprietary bright nickel with a slight scattering of spots (Fig. 5a). The low *p*H phosphorous nickel (Fig. 4a) was inferior in quality to the proprietary bright nickel but ranked considerably above the untreated Watts nickel as shown in Fig. 3a where the gross pores may be readily detected as dark spots on a lighter background. The superiority of the proprietary bright nickel over the untreated Watts nickel serves to show the improvements possible by bath purification and the use of addition agents, since most bright nickel processes are based on the Watts formula.

DISCUSSION

The results obtained with the phosphorous nickel film (Fig. 4a) were slightly disappointing since it was believed that the presence of the phosphorus in the plate would serve to suppress discontinuities. This idea stemmed from the fact that the coating produced is similar in phosphorus content to that of the electroless nickel. The increased porosity of the phosphorous nickel plate may be due to electrophoretically deposited inclusions as a result of the relatively high potential required for the electrolytic bath.

Surface inclusions present in the coatings may be deduced from comparison of the autoradiographs with corresponding boil test results. Such examples occur with the proprietary bright nickel (Fig. 5 middle specimen) and also with the electroless processes (Figs. 6 and 7) where a

few spots were found after the boil test that were difficult to relate to the autoradiographs. It can be conjectured that a foreign particle of density similar to nickel was embedded in the surface. This could account for lessened corrosion resistance to the boil test without showing on the autoradiograph. This phase of the test needs further clarification by experimental work. It has been noted in the case of the Watts plate (Fig. 3) that several small spots on the autoradiographs merge to form one larger rust spot as a result of the boil test.

The most striking departure from comparative uniformity was noted with the low *p*H phosphorous nickel boil test (Fig. 4b). This bath is relatively new and the characteristics of the plate and the operating conditions are not too completely defined. Previous boil tests on phosphorous nickel did not show appreciable numbers of rust spots. The patterns exhibited here may be suggestive of poor adhesion or stressed deposits on these particular coupons. The sunburst effect on the 0.4 mil coupon seemed to radiate more or less from imperfections as suggested by the autoradiograph, although no hint is made to the large central area.

The use of the radioactive method as a tool in the study of porosity seems very promising. From this work it has been found that surface pits (not visible on the boil test figures) as well as pores will be indicated on the autoradiograph. The overall scope of the new method appears more satisfactory than any other single method used to this time. The primary disadvantage seems to be in the subjective type of examination which depends upon the skill of the observer. However, this type of examination is typical of corrosion experiments and is not easily reduced to any simpler terms. Some of the characteristics of the method can be listed as follows:

(a) The method is nondestructive
(b) The procedure is common to most plating techniques
(c) The test does not induce porosity or discontinuities
(d) The test is exactly reproducible
(e) A permanent record is produced
(f) The method is not limited to nickel but may be used for other electrodeposited films
(g) The method could be used in the study of long term corrosion tests by periodic autoradiographs
(h) The specialized equipment needed is equally or more readily available commercially than the diffusion apparatus
(i) Although radioisotopes are used, the radiation level is low enough so that no hazard exists for personnel if normal laboratory care is used.

From the preliminary work in establishing this method it is believed that a new approach is available for the study of porosity in plated films. Further work may be considered to investigate the relation of the autoradiographs before and after various corrosion times and conditions. Consideration should be given to refinement of the method of evaluating the autoradiographs and establishment of a system of standards for comparison.

ACKNOWLEDGMENT

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Zinc and Cadmium Plating

By W. H. Millward*

The problem of corrosion on iron is a major one, and it is unfortunate that we have to depend principally on this metal to furnish our needs in industry. However, the processing of iron, which includes heat treating, cold working and the addition of small amounts of other elements, makes considerable changes in hardness, tensile strength and ductility; and, because of this versatility, it is an excellent material for use in industry. An important factor is its relatively low cost.

Therefore, of necessity, we are confronted with the problem of protecting this surface against corrosion; and, where maximum protection is required, the deposited coatings of zinc and cadmium are considered because of their provision of chemical protection through their sacrificial effect on iron.

For some time, the author's company has used cadmium exclusively as a specified finish on all processed ferrous parts that required maximum protection against the rigors of atmospheric attack, as many of these parts find their way to the tropics or salt-air atmospheres.

During the last year, a zinc plant has been installed and is being used on a particular product, because the mechanical properties of zinc, in this instance, were considered superior to cadmium. It is used, primarily, as a protection of the steel part processed against corrosion.

It is the author's intention, to deal with cadmium and zinc plating processes. An automatic cadmium plating process will be described in detail and will be followed by descriptions of still-vat cadmium and still-vat zinc plating.

AUTOMATIC CADMIUM PLATING

By far, the greater number of parts processed find their way to the automatic plating unit.

This unit is made up of a series of tanks along the top of which carrier bars held at each end by "V" shaped cups are moved by a horizontal chain on each side of the tanks. Stations consisting of vertically moving chains and "V" shaped cups are timed to transfer the carrier bars from tank to tank.

The length of the tanks, in conjunction with the main variable speed motor, control the time the carrier bars take to complete each cycle. Each of the 43 carrier bars, which support the two racks will take a maximum area of approximately 6 sq ft of metal which can be plated in the minimum time of 40 minutes.

The range of complete cycle time of 40 minutes to 120 minutes give a range of seven minutes to 20 minutes in the plating tank.

The maintenance of this unit is of utmost importance. It is oiled completely at weekly intervals and is painted once a year with chlorinated rubber based paint. The appointment of one man, whose responsibility is to see that the automatic is worked correctly and loaded properly as well as keeping maximum production, has been found of extreme value in minimizing breakdowns.

Although, of course, it has its limitations in respect to the article processed, and also there are difficulties in some cases where holes are not permitted in deeply recessed parts and air locks are formed, its output of work is particularly high.

The surface condition of the parts to be plated is required to be free of heavy scale due to the limitations of the time cycles employed, although light films of oxide scale and rust are permitted. Heavy applications of oils or fats generally are not encountered; but, when they occur, they are taken care of adequately by the cleaning cycle.

Racking is kept as simple as possible. Because of the various shapes of the articles, which are processed with two or more holes in them, hooks are used. These are made of 16 gauge brass wire, approximately 2 inches long. A string of articles is made which does not exceed 2 feet in length. Any number of strings up to five then are attached, depending on the size of the article, to the main member rank. It was found that this method of racking had a number of advantages including its adaptability, cost factor and maintenance which is carried out by the personnel attached to the automatic plant.

OPERATION 1

In the initial operation, a soak cleaner is employed and is contained in a 900-gallon steel tank. This is a proprietary soak cleaner used at a concentration of 4 oz/gal, and the temperature is kept near boiling point. Steel-steam coils are used as the heating medium. A renewal of solution is made at 6 monthly intervals. The time cycle is 5 minutes.

OPERATION 2

The work is made the anode in an electrolytic alkali cleaner. The current density is 50 amps/sq ft, which is supplied by a separately excited motor generator set of 12v, 1000 amps capacity. The solution used is a proprietary one containing 8 oz/gal solids. The capacity of the tank is 500 gallons, and the temperature is kept near boiling point by means of steel-steam coils. An air pipe placed across and under the solution at the transfer end keeps the foam free of oil and so lessens the possibility of contamination as the parts leave the tank. The cycle time is 2 minutes, and the solution is replaced every 2 months.

Prior to the use of this particular cleaning method, trichlorethylene was used. Not only was a considerable saving made by changing this process but also a much cleaner surface was obtained. In one instance, a particular brand of metal used on processed parts was causing considerable trouble because it had a tendency to blister the cadmium deposit. It was found that a surface film, possibly received when the sheets were rolled, was the cause. Prepickling of the work was introduced; and, although it overcame the blistering, care had to be taken to segregate the parts, otherwise a production loss would occur. When the anodic cleaner was installed, no trouble was experienced with blistered deposits.

OPERATION 3

Thorough rinsing in air agitated water in a rubber-lined steel tank, and emptied daily is the next step.

OPERATION 4

The work is pickled in a 30 per cent cold sulfuric acid pickle, of a 600-gallon capacity, which is contained in an acid brick-lined steel tank. Lead- and rubber-lined tanks have been used but this tank is considered vastly superior to both of them. Sulfuric acid is found satisfactory and is

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considered an advantage over hydrochloric acid because of its nonfuming properties. Due to drag in of water from the previous rinse dilution of the acid is evident; but, this is tolerated because at regular intervals, when the level of solution gets too high, part of the pickle is discarded and new acid added. This has the effect of keeping the iron content within limits. A blower system is used in this cycle, the time cycle being five minutes.

OPERATION 5

An air agitated water rinse follows.

OPERATION 6

A cyanide cleaner is used in this part of the cycle and is the final cleaning before the plating operation. It is used cathodically at 30 amp/sq ft at a concentration of 6 oz/gal of sodium cyanide. Air is used at the transfer end to keep parts free of contamination as they are transferred to the water rinse.

An important consideration in this cycle is that separate anodes are used. The tank which is of steel should not be used for this purpose. Perforation of the tank usually accompanies this practice; and, in any cleaning cycle whether cyanide or alkali electrolytic cleaning, separate anodes should be employed. A blower is used here, and the solution is renewed monthly. The time cycle is one minute.

OPERATION 7

An air agitated water rinse follows.

OPERATION 8

The work is plated in the following cadmium solution of 1600 gallons capacity.

cadmium (as metal)	6.0 oz/gal	cathodic efficiency = 90 per cent
sodium cyanide (total)	19.0 oz/gal	temperature = 20° C–30° C
sodium sulfate	8.0 oz/gal	current density = 25–30 asf
nickel sulfate	0.25 oz/gal	
turkey oil	1.5 oz/gal	anodes ball
caustic soda	4.0 oz/gal	anode to cathode = 1:1

In the make-up of solution, cadmium oxide is used, which reacts with sodium cyanide to form the complex sodium cadmium cyanide and caustic soda; and, therefore, no initial addition of this salt is required.

The metal concentration should be kept above 5.5 oz/gal for this particular high-speed plating. Below this figure, there is a decline in throwing power.

One of the most important factors in control of the electrolyte is the provision of the correct anode to cathode area. If the anode is too low, a serious depletion in metallic concentration is caused, which necessitates the addition of cadmium oxide, which in turn increases the sodium hydroxide content. This has an effect on the bright range causing a burning of deposit. It also increases the risk of contamination due to impurities if an impure salt is added.

It is felt also that, due to this effect, needless additions of brighteners may be made over a period of time, which could cause a serious breakdown of the solution.

It is suggested, therefore, that, as in the case with any solution, control of metallic content by means of anodes is an essential detail.

The sodium cyanide content of the bath as total cyanide is maintained at 19 oz/gal, the ratio of total cyanide to cadmium metal being 3:10. This constituent aids the anode corrosion and the conductivity. The addition of approximately 25 pounds is made weekly, which indicates that carbonate formation is relatively low and that drag out is not excessive.

Sodium hydroxide has been mentioned before, but it is most important that sufficient concentration is present, due to the effect on the throwing power. It increases the conductivity of the solution. Whenever an addition of Turkey Oil is made, sodium hydroxide is required to maintain normal throwing power. Average consumption of this salt is approximately 10 pounds per month.

Nickel sulfate is added as a metallic brightener at a concentration of 0.25 oz/gal. It acts as a brightener in conjunction with the Turkey Oil but is associated directly with the use of higher current densities up to 40 amps/sq ft. An excess of nickel can cause a definite streaking of deposit.

Turkey oil, which is a sulfonated castor oil, is added initally at 1.5 oz/gal and acts as the organic brightener. Excess of this organic can cause serious unbalance of the solution and result in the resistance of the bath increasing. Activated carbon possibly would be advantageous in removing any excess; but, where considerable quantities are present, large amounts would be required and lengthy filtration time needed. The sodium sulfate is added initially, and its function is a little obscure, but possibly it has an effect on the conductivity, as it does assist the throwing power. We have not made an addition since this bath was first made up.

The sodium carbonate build up is relatively slow, and it has been removed by refrigeration when it approached 15 oz/gal. Approximately 6 oz/gal were left in solution after freezing.

The temperature of the bath should be kept at 25° C, the limits being 20° C to 30° C. Below 20° C, burning of the deposit is apparent at normal cd. Above 30° C, the throwing power is impaired. Therefore, steam coils are required during the winter months. In the summer, on particularly hot spells, water can be passed through the steam coils.

The control of the solution is found to be relatively simple. Efficient laboratory analytical control is maintained, and the metal and cyanide are analyzed weekly. Pilot plating is resorted to every 2 months, for the nickel and turkey oil constituents, and also the sodium hydroxide. Copper contamination is not important, although wherever possible, metallic contamination is avoided.

The minimum time cycle of seven minutes will deposit 0.0002 inch of cadmium. The machine can be slowed down by the variable speed motor, and the cycle time increased to 20 minutes. This cycle time is seldom required.

Ball anodes are used in iron baskets and are found to be superior to flat anodes because of the ease of addition and also because of the nuisance value where flat anodes break off at the line of solution contact. With ball anodes, no waste is encountered. Approximately one cwt of anodes is added weekly.

The anode rods are cleaned weekly, and a lubricant such as vaseline is applied daily to the cathode runners.

The source of current supply is a separately excited 2000 amp/12 volt motor generator set. The tank is of welded steel with glass as insulation on the inside. In addition to the two outer anode rods, a center rod is used which gives an anode-to-anode distance of 12 inches.

Considerable saving of time in cleaning has been found in the nickel and chrome plating of the cathode carrier bars.

OPERATION 9

After leaving the plating tank, the transfer at this station is considerably faster than at the previous transfers due to the fact that staining will occur if too long a time elapses before entering the water rinse.

OPERATION 10

A water rinse for 1 minute follows.

OPERATION 11

Again water rinse for 1 minute.

OPERATION 12

A hot-water rinse is the next step in the cycle. Air nozzles are used again similarly placed at the transfer ends, as in the previous cycles mentioned. The reason is for the same purpose—to keep the plated surface free of contamination.

OPERATION 13

On the transfer, a hot-air blast is used, which is located near the top of the transfer station. This assists in keeping the work from cooling to any large extent and also to remove excess water globules before entering the final drying operations.

OPERATION 14

The work now enters a steam-heated oven which consists of a series of steam coils on both sides, center and bottom of the oven. The time cycle here is 2 minutes.

OPERATION 15

As the work is taken from the machine, so too are the carrier bars. In some cases, the work is lacquered, then after which it is placed with the unlacquered work, carrier bars, rack and hooks on a conveyor belt which traverses the length of the machine to the loading point where the process began. The racks, hooks and carrier bars are taken from the belt and placed into operation again. The plated work then is packed into boxes and transferred as soon as possible to a store adjacent to the plating shop.

This, then, completes a plating process where the vagaries of the human element are kept to a minimum; but, where to a degree, emphasis is placed on efficient laboratory control in maintaining the solutions at their correct formulations.

STILL-VAT CADMIUM PLATING

This process is confined to processed work which is considered too large for the automatic unit or is deeply recessed, or to parts that require special treatment including maximum protection against tropical and salt-air atmospheres. Plating thicknesses of 0.0005 inch to 0.0008 inch are employed; and, where seams are required, preplating of the various parts is carried out before spot welding to insure that no corrosion takes place in the seams. A maximum thickness of 0.0001 inch is deposited in this preplating operation because of welding requirements.

During the last few years, it has been exceedingly difficult to get good quality iron; but, the position has eased slightly during the last few months, and good quality cold-rolled iron is used where possible, because it minimizes the danger of spotting out of the finished article. It also lowers the risk of scale being left in the pores of the metal which, after a period, will form pin-points of rust.

The following is the procedure used in the still-vat cadmium unit:

OPERATION 1

The work is given a trichlorethylene degrease and then pickled in 50 per cent hydrochloric acid. Due to the heavy scale encountered on welded corners, and in some cases, with black iron angle iron frames, hydrochloric acid is used because it has been found advantageous in removing such heavy scale in a minimum of time. After rinsing in cold running water, the work is given a neutralizing dip consisting of 2 oz/gal of a proprietary neutralizer at 180° F.

These operations are carried out in a composite pickling unit, which is used for heavy pickling requirements, and is separate from the plating shop.

OPERATION 2

After transfer to the plating shop, in some cases, the work is processed directly from the shop, the parts are cleaned anodically in an electrolytic alkali cleaner of the same composition and operating conditions as that referred to in the automatic plating unit. The capacity of the steel tank is 450 gallons, and steam coils are used as the heating medium.

OPERATION 3

A rinse in cold running water is the next step.

OPERATION 4

Then there follows a light pickle in 25 per cent hydrochloric acid.

OPERATION 5

A rinse in cold running water is the next step.

OPERATION 6

The work now is etched anodically in a sulfuric acid electrolyte of specific gravity 1.5 to 1.6. This tank contains 450 gallons; lead being used as the tank lining with separate lead anodes. The current density used is 100 amp/sq ft, and the current is supplied by a 12v, 1000 amp separately excited generator. A time of 1 to 3 minutes is considered sufficient, depending on the type and area of the work processed. A blower of marine water-proof plywood is installed and has been in operation for 18 months; and, as yet, no hazards have been apparent.

This part of the cycle is considered of the utmost importance to insure maximum adhesion of the cadmium deposit. The temperature of the bath must be kept near room temperature, otherwise a black smut and roughening of the surface is evident. A similar effect is apparent if the specific gravity of the bath becomes too low. Too low a current density will result in an uneven etching effect. When the concentration of iron becomes too high, spotting of the surface is noticeable. One of the most important considerations is to ensure that rigid contact, preferably double, is used otherwise uneven etching of the surface will result if the contact is faulty. The solution is cleaned every 3 months and requisite amounts of acid are added to maintain the specific gravity.

OPERATION 7

A rinse in cold running water is the next step.

OPERATION 8

The work is plated in a steel tank of 900 gallons capacity. The cadmium solution is of the same composition as used in the automatic plating unit. The same conditions of control are adhered to and the time in the tank is dependent on the thickness required for each plated part. Work with deep recesses or any part subject to air locks is moved in the solution. A movable center anode rod is used in addition to the normal anode rods so that as the work varies in size and thickness correct adjustment of anode to cathode distance can be maintained. A separately excited 12v, 1000 amp generator is used, and steel-steam coils are fitted to the tank.

OPERATION 9

A rinse in cold running water is the next step.

OPERATION 10

A hot-water soak of 30 minutes is used at this part of the cycle.

It has been found, that by the use of this soak, imperfect

adhesion of the deposit can be seen and arrested. This is a quick method to ensure that no blistered deposits leave the plating shop. In opening the pores of the metal, this process has an added advantage as any entrapped salts are removed thereby lessening the danger of spotting out. Cadmium plated springs or other work, where it is important that no hydrogen embrittlement is present, also are given this treatment.

OPERATION 11

In this operation, a chromic acid bright dip is used. The concentration being 100 g/l of chromic acid and 2 g/l of sulfuric acid at room temperature. This dip not only imparts a bright even finish to the deposit but also passivates the surface. Spotting out also is minimized by neutralization of the salts that may be in the pores of the metal. A dip of 10 to 13 seconds is sufficient; but, if prolonged, will attack the cadmium deposit and seriously affect the thickness. A stainless steel tank is used to contain the solution which is renewed when additions of chromic and sulfuric acids do not give the desired effect in keeping a bright finish. A yellow deposit indicates too much sulfuric acid, and a dullness of the deposit usually indicates insufficient chromic acid.

OPERATION 12

A thorough rinsing of the article is the next step.

OPERATION 13

Then there follows a hot-water rinse.

OPERATION 14

Dry by air blast. It is important that the air is free from water or oil particles. An air filter is attached to the air line to ensure that these hazards are absent.

OPERATION 15

In this operation, a proportion of the work is lacquered, care being taken that the work is dried perfectly otherwise imperfect adhesion of the lacquer coat results.

This completes the cycle for normal mild steel processing.

Where castings are encountered, it is advisable, where possible, to shot blast parts prior to light cleaning and pickling. In cases where shot blasting is out of the question, a hydrofluoric dip is beneficial in removing sand from the castings. Thorough rinsing of the part is of great importance because of the porosity of the base metal.

Throughout this still-vat cadmium cycle, reference has been made on a number of occasions to the spotting out of the finished article; and, too much stress cannot be made on the need for good-quality steel. Where porous metal is used, such as with castings and matte-pickled iron, thorough rinsing in cold and hot water followed by a hot-weak chromic acid dip are considered the important steps to be carried out.

The problem of hydrogen embrittlement is encountered from time to time. The most important considerations are minimum pickling, plating time and hot water or oven treatment. Inhibited acid pickles are an advantage; but care must be taken to ensure that all the inhibitor is removed from the surface prior to plating, otherwise imperfect adhesion of the cadmium deposit will result. Scale removed by shot or sand blasting or by mechanical means is an advantage and is used where pickling is not allowed.

BRIGHT ZINC PLATING

It is only recently that zinc plating on a production scale has been used; and, although a number of problems have arisen, fast and efficient plating is being carried out.

The approach to bright-zinc plating is of the utmost importance.

As in the case of any bright plating process, whether it be nickel, copper, zinc, etc., there are definite procedures which must be carried out. These include efficient cleaning cycles, keeping the bath free of metallic or organic impurities, and adequate control of the solution. If these several points are overlooked, successful bright plating is impossible and can become a costly operation. On the other hand, bright plating efficiently done can be of extreme value not only resulting in greater production but also in providing a better finished article. It is the realization of these fundamentals and preparedness beforehand that can make bright-zinc plating a relatively simple and efficient process.

Only one type of processed part is plated; and, therefore, rack requirements are simplified. One rack design is used for the complete volume of work. The racks are coated with a proprietary rack coating.

The work, as supplied, is free of heavy oil or scale; and, therefore, no preliminary cleaning operations other than the normal cycle operations are required.

Polythene tubing is being used to supply the water to the various points in the cycle; and, up to the present time, is quite successful. The welding of the tubing was carried out by shop personnel. Taps of polythene also are installed. The following are the operations in the cycle:

OPERATION 1

An anodic electrolytic alkali cleaner of the same type and concentration as that in the automatic plating unit is used. The capacity of the steel tank is 100 gallons. Eight racks are cleaned at a time, although four racks are taken out every two minutes. Separate steel anodes and steel-steam coils are used. Additions of the cleaner are made twice weekly.

OPERATION 2

A rinse in cold running water contained in a steel rubber-lined tank is the next step.

OPERATION 3

Then there follows an acid dip of 25 per cent hydrochloric acid for two minutes in a steel rubber-lined tank.

OPERATION 4

A rinse in running water contained in a steel rubber-lined tank follows.

OPERATION 5

Plate in the following bright zinc solution, capacity 400 gallons:

zinc as metal.....6.5 oz/gal	current density 30 to 40 amp/sq ft
total cyanide..... 19 oz/gal	temperature 40° C
caustic soda..... 16 oz/gal	anodes flat 99.9 per cent
sodium sulfide.....0.1 oz/gal	
brightener.....1 pint to 50 gals (proprietary)	
ratio of total cyanide to zinc from 2.5 to 3.0	

In the initial make-up of this solution, sodium zinc cyanide, sodium zincate, sodium cyanide and sodium hydroxide from the constituents.

Correct ratio of anode to cathode area is most important. Due to the solubility of the zinc in the solution, the anodes should not be kept in the bath for any extended period while it is not in operation. Bagging of the anodes does assist to a degree in decreasing the solubility rate and of course minimizes rough deposits.

If the increase in metal content of the electrolyte is not

prevented, the ratio of the total sodium cyanide to zinc known as the "M" ratio is affected; and, as this is one of the most critical characteristics of the electrolyte, considerable care should be taken to prevent that increase. Steel anodes can be used to balance the metal content.

When the "M" ratio falls below 2.5, the throwing power of this high-speed bath is impaired. If the ratio is above 3.0, the efficiency is reduced and the bright range affected.

The metal content should not fall below 6.0 oz/gal because in this high-speed plating, maximum concentration is required.

The cyanide concentration should be kept, as is the metal content, at its maximum concentration so that the "M" ratio is from 2.5 to 3.0. The "M" ratio, then, determines the efficiency of the bath and appearance of the deposit.

The sodium hydroxide also should be maintained at its highest concentration. It allows for high-current density range and brightness of the deposit. The concentration should not fall below 13 oz/gal; otherwise throwing power is affected. The temperature is important, as it governs the efficiency to a considerable degree; but very little trouble is experienced as the temperature is maintained at 40° C and does not vary to any appreciable degree. Sodium sulfide is added initially at 0.1 oz/gal. Its function is to precipitate the impurities lead, cadmium and silver as the sulfides if they are present. The presence of these metals dulls the plate. Further additions are made at monthly intervals. The brightener is organic and is added when the deposit shows signs of becoming dull. Checking of the solutions, prior to the addition, is important otherwise excess brighteners may be added because dull deposits can be caused by varying condition of the solution.

The purification of the bath is carried out every two months by the use of activated carbon which, of course, will remove only organics. The solution is heated to 160° F and then pumped into a separate tank, and 2 lbs/100 gallons of activated carbon are added. Thorough stirring is given then to the solution. This process always is used prior to the week end as the sludge settles to the bottom and effective filtration is done easily. As this treatment takes most of the brightener out, requisite amounts are added and the tank is ready for operation.

The use of zinc dust in the purification of the bath was carried out once only when copper was suspected to be present. The same method was applied as with the activated carbon treatment; but here much more difficulty was experienced in the filtration back to the tank, as settlement takes a considerable time, and it is necessary to use a coarse cloth in conjunction with the normal filter pad. This purification should be carried out only when it is absolutely necessary. Too much stress cannot be placed on the indiscriminate cleaning of copper rods where the copper will enter the bath. If brass racks are used and fall in the tank, they should be recovered immediately. Chemical control of the bath is important. Metal, cyanide and caustic soda contents are determined weekly, and the brightener is added as required. The steel tank is welded with steel-steam coil.

The cathode and anode carrier rods are nickel chromium plated. This has been found of advantage as it is much easier to keep the rods clean and minimizes the risk of copper contamination. The anodes are flat but are contained in steel baskets which prevents them from falling in the tank. The anodes are bagged which keeps the solution free of anode particles. The cycle time is eight minutes and there are 16 racks in the bath at any one time. Four racks are removed from the bath every two minutes.

OPERATION 6

A thorough rinsing in cold water follows.

OPERATION 7

Bright dip in a proprietary chromic acid bright dip. A brilliant luster is given the work by this dip which also passivates the surface. If the dip is worked correctly, it will show up faults that are traceable directly to the plating vat, such as dull deposits and metal impurities, therefore it is important to check the plating tank thoroughly before considering the chromic dip as the cause of trouble. The time of immersion is fairly critical and does not exceed eight seconds. If, after addition to the bright dip, no brightening takes place, replenishment of the solution is required. The cost of the dip in relation to each part treated is exceedingly low. It is operated at room temperature.

The steel tank used for the bright dip is lined with polythene; and, as in the case of the water supply, was processed by shop personnel.

OPERATION 8

A thorough rinsing in cold running water contained in lead-lined steel tanks is the next step.

OPERATION 9

Then there follows a hot water rinse in a lead-lined steel tank. Tanks are fitted with copper steam coils.

OPERATION 10

Parts are dried in an electrically heated centrifugal drier. In this operation, four racks at a time are emptied into a chute which feeds the centrifugal drier.

OPERATION 11

The work is packed into boxes and after inspection is removed from the plating shop. Although this process is confined to one production part where varying shapes and sizes are required to be plated, it is felt that successful bright zinc plating can be carried out if consideration is given beforehand to the control of cleaning cycles and design of plant so that contamination of the plating bath is kept to a minimum.

The author has tried to cover most of the practical aspects of cadmium and zinc plating. As to the relative merits of zinc and cadmium, the author feels that the industry is indeed fortunate in having these two metals for the protection of iron and steel.

The figures, showing the waste due to corrosion, are particularly high, but they would be much greater if these two metals were not procurable.

In some cases, cadmium is superior to zinc, thickness-for-thickness, especially in tropics and salt-air atmospheres, resistance to alkalis, and ease of soldering. Zinc is not easy to solder and is attacked by alkalis; but, because of its relatively low cost as compared with cadmium, it will be used for most commercial applications, but only on the condition that the basic fundamentals of bright plating are observed.

WILLIAM H. MILLWARD was associated with Amalgamated Wireless (A'sia) Ltd., as Supervisor of the Plating Department. At present is Technical Sales Representative of Classic Electroplating Supply Co., Pty., Ltd. Has been connected with the trade for twenty years. Served apprenticeship of Electroplating and Polishing under Eru Wright of Australia General Electric, Pty., Ltd. (Mr. Millward's picture did not reach us in time for this issue—Ed.)

POLAROGRAPHIC DETERMINATION OF COPPER IN CYANIDE

By

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and

G. TATOIAN

INTRODUCTION

The work reported in this communication is a part of a general study undertaken in the authors' laboratory to develop polarographic methods for the control of plating solutions.[1,2] The procedure and data presented are for the rapid determination of copper in cyanide and acid copper plating baths.

Among the many advantages of the polarographic method in plating solution control is the possibility of eliminating the tedious and time consuming acid digestions which are required with the conventional chemical methods. The objective was to find a supporting electrolyte which would dissolve copper cyanide at room temperature and yield a satisfactory polarogram for copper.

The standard potentials of the couples involving simple cuprous ions, simple cupric ions and copper analgam are:[3]

$Cu^{+} + e + Hg = Cu(Hg)$ $\quad E^{\circ} = +0.108v$ (N.C.E.)
$Cu^{++} + 2e + Hg = Cu(Hg)$ $\quad E^{\circ} = -0.003v$ (N.C.E.)
$Cu^{++} + 3 = Cu^{+}$ $\quad E^{\circ} = -0.115v$ (N.C.E.)

Since less energy is required to reduce the cupric ions to the metallic state than to the cuprous ions, the simple cuprous ions are not able to exist at the potential that the cupric ions are being reduced. The polarogram of a solution containing simple cupric ions will therefore show only a single wave corresponding to the reduction of cupric ions to the metallic state. An example would be the reduction of cupric ions from a sulfate solution.

In the presence of complexing agents such as ammonia and chloride ions which form stable complexes with copper the standard potentials are shifted in the negative direction. Usually the potential for the $Cu^{+} = Cu(Hg)$ system will be shifted to a greater extent than that for the $Cu^{++} = Cu^{+}$ system and the cuprous ions can then exist so that the polarogram in a solution containing cupric ions and complexing agents will show a double wave. The first wave is due to the reduction of cupric ions to cuprous ions, while the second wave is due to the reduction of the cuprous ions to the metallic state. It will be obvious, that if the copper is present entirely as the cuprous complex ion, only the second wave is obtained.

Copper does not show any wave in alkaline solutions containing cyanide because the cuprous cyanide complex is so stable that its reduction potential is too negative.

When polarograms of copper yield a double wave, the second wave is generally used to measure the concentration of the ions.

A consideration of the above fundamentals and the results of some exploratory experiments indicated that an acid solution containing a high concentration of chloride ions should make a suitable supporting electrolyte. Although other metallic ions such as lead and cadmium have half-wave potentials which are close to copper in such a medium, their concentrations as impurities will be very much smaller than that of copper so that no significant interference should result.

EXPERIMENTAL

Apparatus and Materials

The apparatus and experimental conditions were the same as previously described.[1] A Patwin Electro-Polarizer, Model C1* was used with a Patwin polarographic cell and a saturated calomel electrode. The capillary constant was 1.83 $mg^{2/3}sec^{-1/2}$.

Standard solutions were made up with distilled water and chemically pure salts. The copper content was determined by both the thiosulfate method and by the electrolytic method. The gelatin solution was made as previously described.[1]

Supporting Electrolyte

Exploratory experiments were run using 0.25 ml sample of a Rochelle-Cyanide bath, plus 2 ml of 0.2 per cent gelatin solution, and diluting to 50 ml with the supporting electrolyte. The composition of the plating solution was as follows:

		oz/gal
Cuprous cyanide	CuCN	8.0
Total sodium cyanide	NaCN	10.0
(Free cyanide)	NaCN	1.2
Sodium carbonate	Na_2CO_3	5.0
Rochelle Salt	$NaKC_4H_4O_6 \cdot 4H_2O$	6.0

It was found that the chloride concentration of the supporting electrolyte should be about 12 N and the acid concentration at least 2 N in order to have the plating solution sample completely dissolve without applying heat. Although 12 N HCl produced satisfactory results and a good linear calibration curve was obtained, it was decided that it would be highly desirable to reduce the acid concentration because of the corrosive nature of the fumes.

Experiments were performed with various mixtures of HCl and chloride salts. The most satisfactory mixture was found to be $CaCl_2 \cdot 2H_2O$ = 6.8 N (500 g/l) and HCl = 3.0 N (250 ml/l), which was finally chosen as the supporting electrolyte.

Although there is a tendency for some of the copper to precipitate on long standing in the above solution, no appreciable error was ever encountered unless several hours elapsed between mixing the solution and running the polarogram.

Cupric ions yield a double wave in this medium. A typical polarogram obtained with a copper sulfate solution is shown in Fig. 1. Cuprous cyanide solutions yield only the second wave as shown by the curve in Fig. 2. This represents a typical polarogram for a cyanide copper solution.

It should be noted that if the polarographic solution containing the copper cyanide solution is allowed to stand for any appreciable length of time, some of the cuprous ions will be oxidized by the air to cupric ions. A polarogram

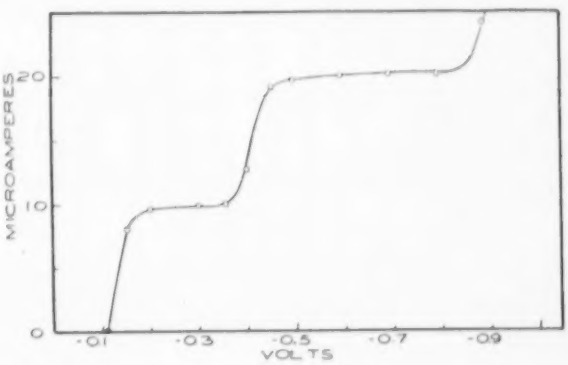

Fig. 1

TABLE I. DIFFUSION CURRENT CONSTANT FOR COPPER

CuCn in Plating Solution oz/gal	Diffusion Current I_d Microamperes			Constant (Microamperes per oz/gal)		
	86° F	77° F	68° F	86° F	77° F	68° F
3.41	—	—	—	—	—	—
6.82	—	5.59	5.59	—	0.820	0.743
8.52	7.56	6.94	6.50	0.887	0.815	0.763
11.9	10.75	9.81	9.16	0.902	0.823	0.768
17.0	15.30	14.05	12.85	0.900	0.826	0.756
	Average			0.896	0.821	0.758

*Electro-Polarizer, Model C1, manufactured by Patwin Instruments Division, The Patent Button Company, Waterbury, Connecticut. $m^{2/3}t^{1/6}$ = 1.83 $mg^{2/3}sec^{-1/2}$. Values are for 0.25 ml of plating solution diluted to final volume of 50 ml. I_d read at −0.25v and −0.650v.

would then show a double wave. The diffusion current corresponding to the first wave, will depend upon the extent of the oxidation. In all cases, however, the diffusion current obtained from the second wave will always give the total concentration of copper ions.

The second wave may be used for both copper sulfate and copper cyanide solutions.

Procedure and Calibration Curves

Standard solutions of copper sulfate were used to obtain the calibration curves. The concentrations were adjusted so that the final results would correspond to the use of 0.25 ml sample of plating solution diluted to 50 ml with supporting electrolyte. The procedure used in obtaining the calibration curves was the same as that given below for plating solutions. Curves were obtained at three temperatures and are shown in Fig. 3. The numerical results are given in Table I.

The procedure for determining copper in a cyanide plating solution or an acid copper solution is as follows:

Pipette a 0.25 ml sample of the plating solution into a 50 ml volumetric flask, add 2 ml of 0.2 per cent gelatin solution and dilute to the mark with supporting electrolyte. Transfer about 4.0 ml of this solution to the polarographic cell and deaerate with nitrogen.

Polarograph the solution by reading the current at −0.25v and −0.65v. The difference between the two readings is equal to the diffusion current for copper.

With this procedure a copper determination may be run in a few minutes.

This procedure has been used very successfully in our control laboratory for determining copper in production baths. A comparison of the polarographic results with those obtained by conventional chemical methods shows that they generally agree to within 0.2 oz/gal. The values shown in Table II were chosen at random and are representative.

TABLE II. COMPARISON OF RESULTS AS OBTAINED BY THE POLAROGRAPHIC AND CHEMICAL METHODS ON A PRODUCTION ROCHELLE COPPER BATH*

CuCn in oz/gal	
Chemical Method	Polarographic Method
8.30	8.20
8.25	8.20
8.25	8.30
8.00	8.00
7.90	8.00

*Results were chosen at random from control records.

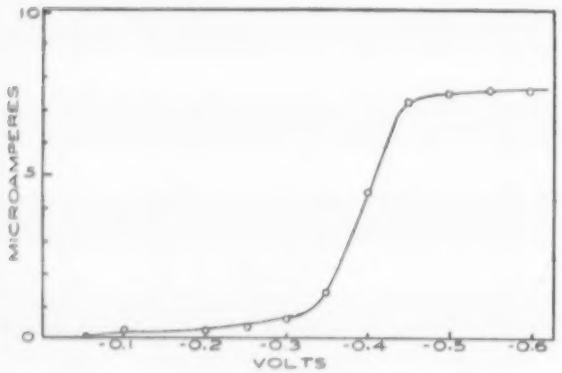

Fig. 2

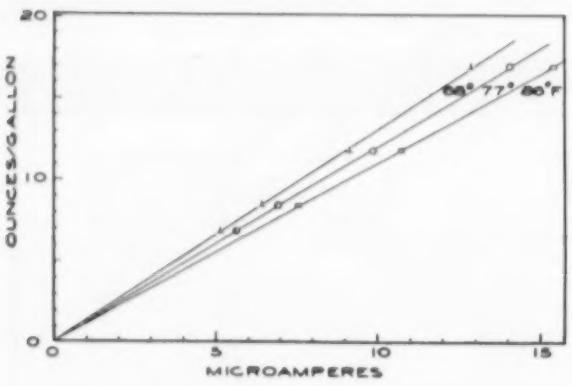

Fig. 3

ACKNOWLEDGMENT

The authors wish to express their appreciation to D. Lake for his valuable assistance in the experimental work.

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[2] J. V. Petrocelli and G. Tatoian, "Polarographic Methods of Analysis for Plating Solutions," published by The Patent Button Company, Waterbury, Connecticut (1954).

[3] I. M. Kolthoff and J. J. Lingane, "Polarography," 2nd Edition, Interscience Publishers, New York (1952).

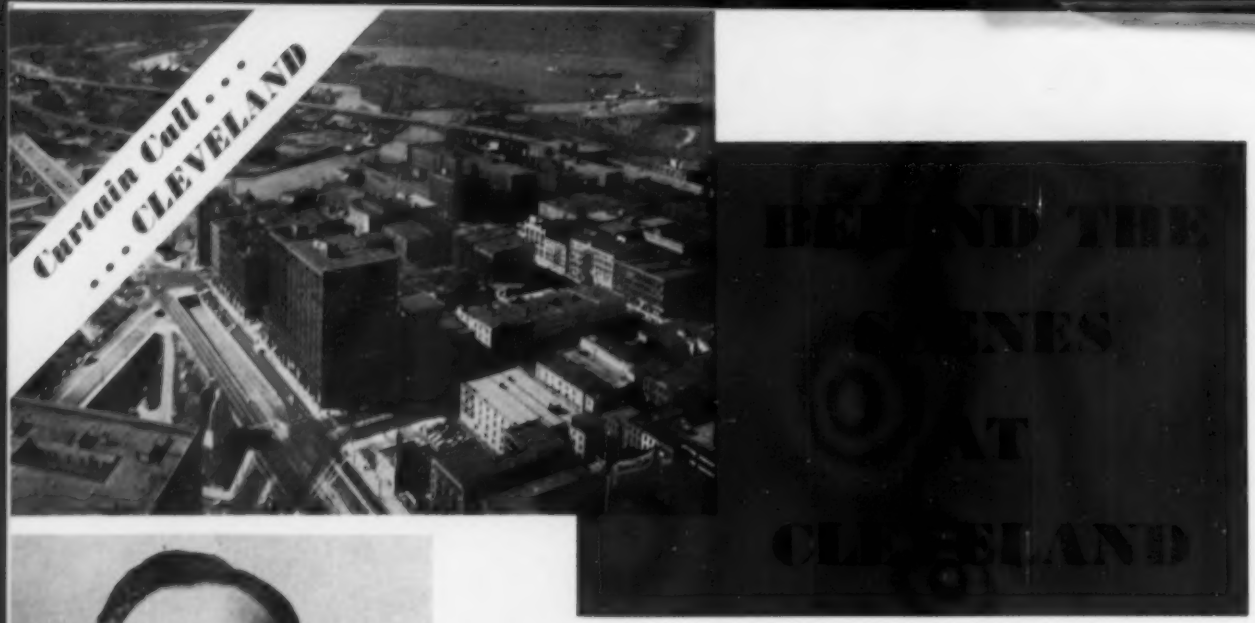
Pettrocelli

J. V. PETTROCELLI is Director of Research, The Patent Button Company, Waterbury, Connecticut. Received a B.S. degree at Wesleyan University, Ph.D. degree at Yale University. At present is Chairman of the Corrosion Division of The Electrochemical Society and President of the Waterbury Branch of the AES. Has been active in research work in the field of electrochemistry particularly plating, corrosion and instrumentation and has authored several papers on the mechanism of electrode processes. He is a member of the American Association for the Advancement of Science, The Electrochemical Society, ACS and AES.

Tatoian

GEORGE TATOIAN is Chemical Engineer, Research Staff, The Patent Button Company, Waterbury, Connecticut. Received a B.S. degree in Chemical Engineering, Missouri School of Mines and Metallurgy, University of Missouri in 1944. Has several papers published on polarographic procedures and flame photometry. Is a member of the ACS and AES.

1955 INDUSTRIAL FINISHING EXPOSITION AND 42ND ANNUAL CONVENTION of the AMERICAN ELECTROPLATERS' SOCIETY



Leon R. Westbrook, Chairman of the Exposition Committee

Convention and Exposition Plans Complete!

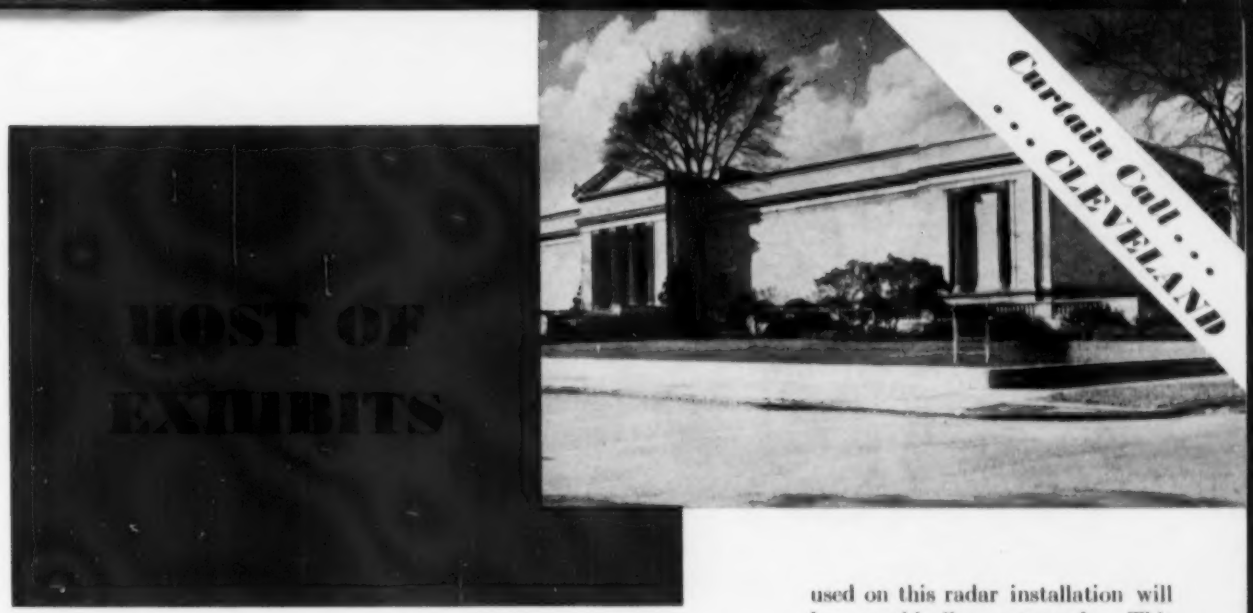
FOR the past twelve months, 98 committee members have been at work planning the 1955 Industrial Finishing Exposition and 42nd Annual Convention of the American Electroplaters' Society, June 20 to 23 inclusive at the Cleveland Public Auditorium. These Clevelanders have banded together to create one of the most outstanding convention programs ever staged by the AES. The Educational Sessions will offer some 40 technical papers covering every phase of industrial finishing.

Arrangements for the registration and housing of the 12,000 production and engineering executives who will attend the Exposition and Convention have been made by the registration committee. Housing is being handled through the Housing Bureau, 511 Terminal Tower, Cleveland, Ohio. Blocks of rooms in the major hotels have been set aside to accommodate the attendees.

Dr. Ralph A. Schaefer, President, American Electroplaters' Society

Eugene L. Combs, Convention Chairman

Advisory Committee: (seated, left to right) C. R. Wheeler, Harvey Heil. (Standing, left to right) Harry Pochapsky, L. N. Elicker, S. P. Palisin and Howard Blouch



THE 1955 Industrial Finishing Exposition promises to be one of the most interesting shows ever held by the American Electroplaters' Society. According to Leon Westbrook, Chairman, Exposition Committee, more space has been sold than in any previous society show. Westbrook advises that exhibitors are planning to ship huge machinery into the exposition halls of Cleveland Public Auditorium. The machinery to be exhibited will transform the Public Auditorium into the world's largest finishing plant for the duration of the show. Udylite Corporation will exhibit a unit 44 feet long, 12 feet wide, and 10 feet high. This machine will be moved intact in one piece into the Auditorium.

Among the many products to be exhibited are: buffing and polishing compounds and machines, coatings of various kinds, tumbling barrels, heat exchangers, filters, pumps, rust proofing material, degreasing equipment, metal cleaning compounds, racks, thickness gages, rectifiers, motor generators, automatic and semi-automatic plating machines, tanks and linings, and hundreds of other products.

Going all out to make this the biggest and best exposition ever, the show will display an operating model of radar equipment. Various items of industrial finishing plants used on this radar installation will be graphically portrayed. This equipment should prove of great interest to everyone. Research projects of the AES now in process will be dramatically displayed in the AES Research Committee booth.

The Exhibit hours are:

Monday, June 20—
10:00 A. M.– 6:00 P.M.

Tuesday, June 21—
12:00 A.M.–10:00 P.M.

Wednesday, June 22—
9:30 A.M.– 6:00 P.M.

Thursday, June 23—
9:30 A.M.– 4:00 P.M.

On Wednesday afternoon no educational sessions will be held. This will allow the entire afternoon for all AES members and guests to visit the exhibits.

Registration Committee: (seated, left to right) William Acks, Chairman; Gilbert Schaedler, C. A. Cairick, William Radtke, Ralph Everstine. (Standing, left to right) George Walton and Jay Becker

SOCIAL functions have been scheduled so that everyone will have an opportunity to attend without interference with the educational sessions and exposition. On Sunday evening, June 19 at 8:30 P.M. the AES "Get Together Party" will be held in the Ball Room, Hotel Statler. Monday evening at 9:00 P.M., the Metal Finishing Suppliers' Association will hold their Open House in the Rainbow Room of the Hotel Carter. Thomas A. Trumbour, Manson Glover, A. P. Munning, and Dr. M. M. Beckwith are in charge of MFSA arrangements. Tuesday at 9:00 A.M. the Metal Finishing Suppliers' Association will hold a Brunch in the Ball Room of the Hotel Hollenden, which will be followed by their annual meeting. The Athletic Committee has scheduled the annual East-West Ball Game for 9:30 on Tuesday morning. In the afternoon the Annual Golf Tournament will be sponsored by the Metal Finishing Suppliers' Association at the Sleepy Hollow Country Club, under the chairmanship of J. J. Duffy. Arrangements have been made for golf for a limited number of guests at four private clubs for Sunday, June 19 and Monday, June 20. The clubs are Chagrin Valley Country Club, Lakewood Country Club, Manakiki Golf Club and Sleepy Hollow Golf Club.

Wednesday evening, June 22 at 9:00 P.M. the AES Floor Show and Dance will be held in the Ball Room, Hotel Statler. Thursday evening, June 23 at 7:00 P.M. the Annual Banquet will be held in the Rainbow Room, Hotel Carter.

In addition to the planned social events scheduled for those attending the 1955 Convention and Exposition, there are also a great many interesting things to do and see throughout the city of Cleveland.

A complete list of civic points of interest can be found on pages 529 and 530. Cleveland abounds with unusual sights, beautiful parks and municipal attractions of all kinds.

Convention-goers are invited to drop by the AES Booth in the Public Auditorium for assistance in planning their social schedules. Members of the national office will be in attendance at all times and will be happy to help in any and all capacities.

A bit of advice: June is apt to be warm—be sure to bring along light summer clothes for all occasions—plus a few heavier things just in case the wind begins to blow in from Lake Erie.

Baseball fans can, of course, see the American League Champs in action in their home stadium. Also, sailing, swimming and sunning can be had for the asking at many points along the lake shore.

All in all, those attending the exposition and convention this year can look forward to a program full of social enjoyment and entertainment of all descriptions.

Entertainment Committee: (left to right) J. T. Bohovic, J. D. Little, Chairman, and Joseph Rhoads

Curtain Call . . .
. . . CLEVELAND

THE recently organized Ladies Auxiliary of the Cleveland Branch under the supervision of the President, Mrs. Frances Hoffman, has planned a fascinating program designed to interest the ladies who will accompany the AES members and guests. The events have been built around a theme of "Living in Cleveland." On Monday, June 20, at 12 noon, the ladies will visit the Alpine Village for luncheon and entertainment. The Alpine Village is Cleveland's outstanding supper club. On Tuesday, at 12 noon, the Aunt Ella Luncheon with Style Show will be held in Higbee's Department Store. This luncheon will be sponsored by Oakite Products, Incorporated, and the host will be Dave Clarin.

Wednesday, June 22 at 9:00 A.M., a tour will be made in a fleet of buses to the Westgate Shopping Center where the merchants have arranged special sales and events for the AES ladies. Following this, the ladies will be taken to the Lake Shore Hotel where a luncheon, sponsored by the Udylite Corporation, will be held. Host at the luncheon will be Dr. R. B. Saltonstall. Thursday morning, at 10:00 A.M., the Plato Party will be held in the Hotel Cleveland. Joan T. Wiarda will be in charge of the distribution of the many prizes purchased by the Ladies Committee for this affair.

At 12:30 P.M. Thursday, the Ladies Auxiliary will attend a luncheon in the Hotel Cleveland. Dorothy Fuldheim, noted news analyst, will be the featured speaker. Other officers of the Ladies' Auxiliary are: Vice-President, Mrs. George Shepard; Recording Secretary, Mrs. William King; Treasurer, Mrs. Robert Platt; and Corresponding Secretary, Mrs. Theodore Pavlish.

Ladies Auxiliary of the American Electroplaters' Society, Cleveland Branch: (1st row, left to right) Margaret Piovarey, Ann Pavlish, Ann Platt, Frances Hoffman, Rita Shepard, Gwin King, Eleanor Renton, (2nd row, left to right) Veronica Zinn, Irena Solla, Adelaide Ott, Charlotte Sedusky, Dorothy Allen, Marcella Oberg, Louise Pavlish, Margaret Schaefer. (3rd row, left to right) Gertrude Lowe, Lucille Schaefer, Alice Baker, Dorothy Sztul, Ann Boguski, Mary Combs and Marie Hoefer

ACCORDING to E. L. Combs· Chairman of the Convention Committee, the following papers will be presented at the indicated sessions:

June 20

MONDAY AFTERNOON 2:00 P.M.
FIRST SESSION

"Factors Affecting the Wear Life of Cloth Buffs" . . . . . **E. T. Candee**

"The Anodic Etch in Preparation for Plating" . . . . . **V. L. McEnally, Jr. and Fred G. Brune**

"The Plating of Beryllium Copper" **S. J. Morana**

"Metal Cleaning Evaluation Using Tagged Soils" . . . . . **J. Hensley**

June 21

TUESDAY MORNING 9:00 A.M.
SECOND SESSION (dual)

Session A

"A Study of Hydrogen Embrittlement in Regard to Electroplating" **Carl Biser**

A. Sound and Color Movie
B. Paper on Hydrogen Embrittlement

"Abrasive Blasting as a Metal Finishing Tool" . . . . . **C. Forestek and G. Kaufman**

"Electroless Nickel Plating of Non-Conductors" **Philip H. Eisenberg and Harold C. Schneider**

Session B

"Tin and Tin Alloy Plating" **Robert T. Gore**

"Vacuum Metallizing of Metal Parts" **J. Gordon Seiter**

"The Effect of Different Chromium Deposits on the Fatigue Strength of Hardened Steel" . . **J. E. Stareck, E. J. Seby and A. C. Tulumello**

"Practical Methods for Treatment of Metal Finishing Wastes" **J. C. Hesler**

TUESDAY AFTERNOON 2:00 P.M.
THIRD SESSION

"Electrotinning of Copper Wire from the Stannous Fluoborate Bath" **A. E. Carlson**

"Lead-Tin-Antimony Alloy Plating" **R. T. Putnam and E. J. Roser**

Educational Committee: (left to right) Henry R. Friedberg, Arthur H. DuRose, Co-Chairman; John B. Winters, Chairman; E. J. Roehl, Co-Chairman; Marilyn Sanicky and Robert W. Wild

"Diffused Nickel-Cadmium as a Corrosion Preventive Plate for Jet Engine Parts" ..... **R. W. Moeller and W. A. Snell**

"The Application of Ultrasonics to Various Plating Systems" **Stanley R. Rich**

June 23

WEDNESDAY MORNING 9:00 A.M.
FOURTH SESSION (dual)

Session A

"Some Aspects of Solution Level Controls" ..... **John W. Holland**

"Recovery of Plating Wastes" **Louis Weisberg and E. J. Quinlan**

"Filtering Chrome Plating Solutions" **R. F. Ledford and L. Gilbert**

"Comparison of Selenium Rectifiers to Germanium Rectifiers" **J. F. Beall**

Session B

"The Theory and Practice of Airless Spray Painting" ..... **James Bede**

"The Flow Coating of Organic Finishes" ..... **E. A. Zahn**

"Qualities, Processing, and Future of Porcelain Enamel and Ceramic Coatings" ..... **E. E. Bryant**

"Electrophoretic Deposition of Metallic and Composite Coatings" **J. J. Shyne, H. N. Barr, W. D. Fletcher and H. G. Scheible**

June 24

THURSDAY MORNING 9:00 A.M.
FIFTH SESSION

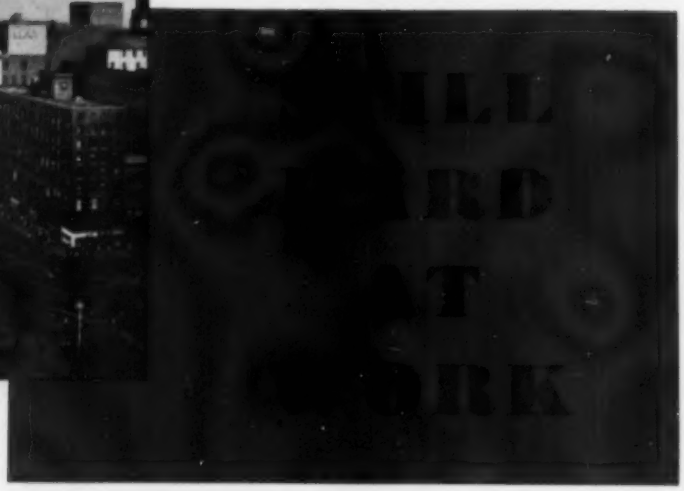
"Copper Anode Corrosion in Cyanide and Acid Copper Plating Baths" **W. H. Safranek and C. L. Faust**

"Methods of Conducting Classes for Electroplaters" ..... **Ezra A. Blount**

"Accelerated Corrosion" **W. L. Pinner**

"Report from AES Research Committee" ..... **Earl J. Serfass**

Publicity Committee: (seated, left to right) J. W. Baker, Chairman; Harry F. Allen (standing) and Alvin E. Seeley



Athletic Committee: (seated, left to right) John Vanas, Robert Renton, Chairman; George Shepard, Co-Chairman. (Standing, left to right) Edward Bolen, Stephen Palisin

Dr. Ralph Schaefer, President, AES (left), and Gene Combs, General Chairman, conferring on plans for the coming show

Banquet Committee: (left to right) John Hallack, J. C. Tervay, F. H. Bruening, R. A. Wheeler and A. R. Hoffman

Plant Visitation Committee: (left to right) Earle J. Esner, William M. King, Chairman; J. H. Hoefer, Co-Chairman, and Henry J. Sedusky

Surface Treatment of Metals With Peroxygen Compounds

By Paul H. Margulies

A great many surface treatments applied to metals involve the use of solutions containing oxidizing agents. These agents are mainly chromates or nitrates and the corresponding acids. In many other cases, however, the use of peroxygen compounds offers advantages or is a necessity.

Peroxygen compounds, useful for the surface treatment of metals, comprise hydrogen peroxide, compounds forming hydrogen peroxide in solution, persulfates and peracids.

It is the purpose of this article to picture the role played by peroxygen compounds in treating metal surfaces by citing various processes which have been developed and investigated in this country and abroad by many different, individual or corporate researchers. Complete coverage of the field has not been attempted in this review, and the various examples cited are meant to serve as illustrations only.

The treatment of metal surfaces with oxidizing agents can be grouped, although very roughly, according to the desired result. One type of treatment aims at producing an oxide film on the metal surface proper. A second type serves to remove undesirable components of the metal surface, which may be surface impurities generally or more specifically components of the metal surface itself. Somewhat overlapping with this is a third type of treatment applied to dissolve and thus remove metal from a metal surface. Oxidizing agents are also useful in a somewhat different fourth type of treatment, where they serve to keep constituents of certain treating solutions in the proper state of oxidation.

Peroxygen compounds are of actual or potential usefulness in all four types of treatments. Staining and passivating procedures may be given as examples for the first type of treatments. A typical staining treatment is represented by the "browning" or burnishing method of producing a brown to black surface finish on iron and steel. This is done on a large scale to finish small metal parts which lend themselves to an immersion treatment in the process solution. "Browning" is a simple and economical way to obtain a relatively rust resistant finish on iron and steel and to improve the appearance of the finished article. An advantage of the process is that the dimensions of the article are not changed by the treatment. The treatment is generally carried out by immersing the pieces in a hot, strongly alkaline solution containing an oxidizing agent. Sodium hydroxide is the alkali commonly used, and a variety of oxidizing agents have been recommended. Among these are sodium peroxide or its equivalent, hydrogen peroxide. One recommended solution contains 300 to 400 g/l of sodium hydroxide and 50 to 100 g/l of sodium peroxide (or about the same amount of commercial 50 per cent hydrogen peroxide).

BLACK FINISH FOR ZINC AND CADMIUM

A highly durable black finish for zinc and cadmium consists of a strongly adherent film of fine-grained copper oxide. The article to be treated is first immersed for a few seconds in a bath containing a soluble copper salt and a chlorate such as potassium chlorate. In a second step the article is treated with a hydrogen peroxide solution, which serves to increase both the blackness and the adherence of the finish. A treatment with a permanganate may preferably be applied after the first and before the second step. The three steps are repeated about ten times, each step consisting of an approximately 10 second dip in the respective solution, followed by a few seconds draining period. This finish can also be applied to other base metals after zinc or cadmium plating.

IMPROVING ELECTRICAL CHARACTERISTICS OF CUPROUS OXIDE SURFACES

One method of improving the electrical characteristics of the cuprous oxide surfaces used in copper oxide rectifiers is the removal of surface components by oxidation. In this process the copper is first oxidized in a manner which leaves adjacent to the copper a layer of cuprous oxide superimposed by a layer of cupric oxide. This latter is removed by acid etching and the resulting oxide surface is then treated for a few minutes with a solution comprising equal parts of ammonium hydroxide and hydrogen peroxide.

Another example of a copper cleaning process is one in which an oxidizing agent is used to oxidize relatively insoluble cuprous oxide present on the surface of the copper article to the more easily soluble cupric oxide. A slight corrosive effect of the oxidizing agent further promotes cleaning by causing a flaking off ofinsoluble foreign matter present on the surface. The cleaning solution claimed to be particularly efficient is an aqueous solution containing 5 parts of sulfuric acid, 4 to 5

Cast iron hinge parts are strung in batches on copper wire and hung on racks in preparation for plating processes

parts of hydrogen peroxide, 30 per cent and 3 parts of acetic acid in about 87 parts of water. Although hydrogen peroxide is the preferred oxidizing agent, a peracid such as peracetic acid might possibly be useful in this process, which is carried out by immersing the article to be cleaned for about 10 minutes at room temperature in the treating solution and following this with a water wash.

CLEANING TIN, ZINC AND ALUMINUM

A solution useful for cleaning tin, zinc and aluminum surfaces without etching or discoloring such surfaces consists of 63 parts of trisodium phosphate, 25 parts of sodium silicate of low alkali ratio, 2 parts of magnesium sulfate and 10 parts of sodium perborate. For this last named ingredient other hydrogen peroxide addition compounds compatible with the rest of the mixture could be substituted. The cleaner is employed in aqueous solution of optional concentration.

REMOVING IMPURITIES FROM SILVER OR PLATE

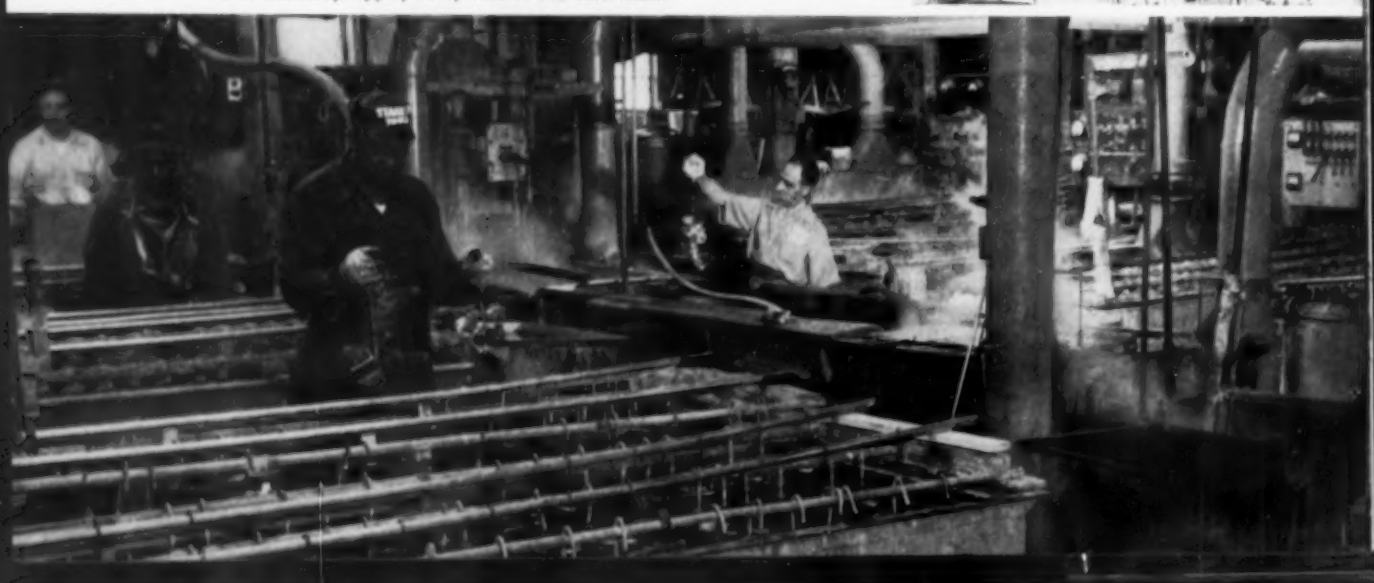
It is known that cooking and eating utensils made of silver or plated with silver sometimes acquire an unpleasant taste or odor which is not removed by the usual washing and cleaning procedures. The objectionable taste or odor is mainly due to organic sulfur compounds firmly adhering to the metal surface. These compounds can be removed by surface oxidation, which, of course, has to be carried out so as not to damage the utensil. This is possible by immersing the utensils in a hot solution of dilute hydrogen peroxide or by polishing them with a composition consisting of mild abrasives in mixture with solid peroxygen compounds such as sodium carbonate perhydrate, sodium perborate and others. A particularly efficient product is said to be obtained by incorporating urea peroxide in the polishing mix described above.

ETCHING AND STRIPPING

The principal purpose of etching and stripping procedures is the removal of all or part of a given metal surface or metal layer. The use of hydrogen peroxide is well established for etching specimens in the metallurgical laboratory; persulfates

(Top) Parts are doused in cold water; will then be fully neutralized in a sodium cyanide bath. (Bottom) Cast iron hinge parts leave the cadmium plating tank

Parts are placed in plating bath of cadmium solution in which hydrogen peroxide acts as a purifying agent. This general view of the big Nelkin plant in New York shows some of the tanks for plating with cadmium, copper, silver, rhodium and other metals



Small parts are dipped before final drying in a solution of hydrogen peroxide to give maximum brightness to the cadmium surface

are also used for this purpose. Alkaline hydrogen peroxide solutions are used for the etching of carbides, nitrides, tungstides. In the macroetching of iron and steel, ammonium persulfate solutions help to show details of metal structure for visual inspection. Hydrogen peroxide and ammonium persulfate are also used in the etching of copper and its alloys.

The properties of electrical contacts made from metal compositions comprising a refractory compound, such as tungsten carbide, and a fusible metal, such as copper, are improved by etching their surface with a solution containing about 15 to 30 per cent of hydrogen peroxide and about 8 per cent of ammonium hydroxide.

Peroxygen compounds are also useful for stripping a metal-coating from a base metal. The following are some typical stripping solutions:

Brass from steel:	Ammonium persulfate	75 g
	Ammonium hydroxide	335 ml
	Water	665 ml
Gold from copper, nickel and iron or their alloys:	Sodium cyanide	2 oz
	Water	1 pt
	Hydrogen peroxide 30 %	½ oz
Lead from copper alloys and steel:	Glacial acetic acid	1 vol
	Hydrogen peroxide 5 %	1 vol
	Water	3 vol
Lead from silver:	Glacial acetic acid 95%	by vol
	Hydrogen peroxide 30%	5% by vol

The so-called "bright-dip" processes are related to the etching and stripping procedures outlined above. They brighten a metal surface by chemically removing high spots and other surface irregularities and also help to remove surface contaminants. Here again, peroxygen compounds are useful.

CONTROLLING IRON AND STEEL PHOSPHATIZING SOLUTION

An example for the fourth type of treatment in which oxidizing agents serve to keep constituents of certain treating solutions in the proper state of oxidation is the use of hydrogen peroxide to control the chemical composition of the process solutions used in phosphatizing iron and steel.

Iron and steel articles are frequently protected against corrosion by applying a phosphate coating, more particularly a zinc phosphate coating. This may be done by treating the article to be coated with a warm solution of zinc oxide and phosphoric acid in water. A ferrous article, however, in contact with phosphoric acid, will shortly react with that acid to give rise to formation of ferrous phosphate with simultaneous liberation of hydrogen. As the coating bath is preferably kept close to *p*H 3, the ferrous phosphate will remain in solution, unless oxidized to ferric phosphate, which, being insoluble above approximately *p*H 2, will precipitate out and can then be removed with the sludge or by filtration. Interference of soluble ferrous phosphate with the desired zinc phosphate coating can, therefore, be prevented without introduction of foreign ions into the bath by hydrogen peroxide oxidation of the ferrous to ferric phosphate.

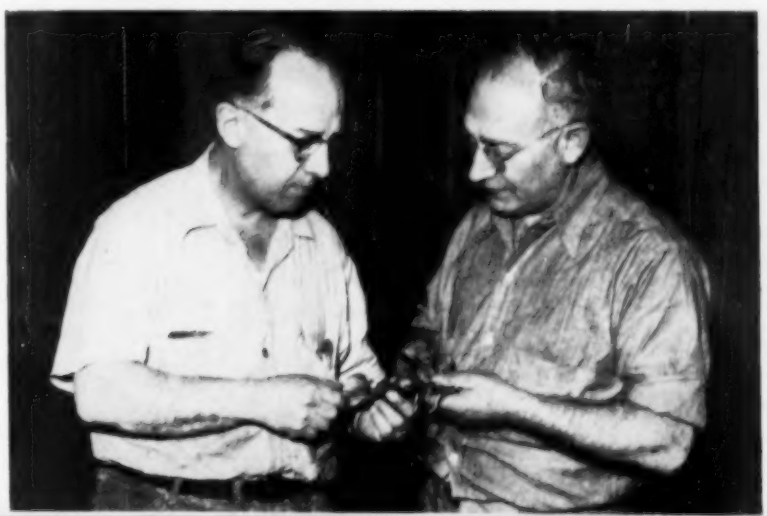
The amount of hydrogen peroxide to be used is rather critical and depends on the particular treating bath used. Satisfactory coatings require, e.g., a phosphoric acid solution with a zinc content of about 0.25 per cent and not under 0.1 per cent nor over 0.5 per cent with hydrogen peroxide present in the solution in amounts between 0.004 per cent and 0.024 per cent, and further containing enough sodium hydroxide to obtain a *p*H of about 3, the treatment being carried out at below 130° F.

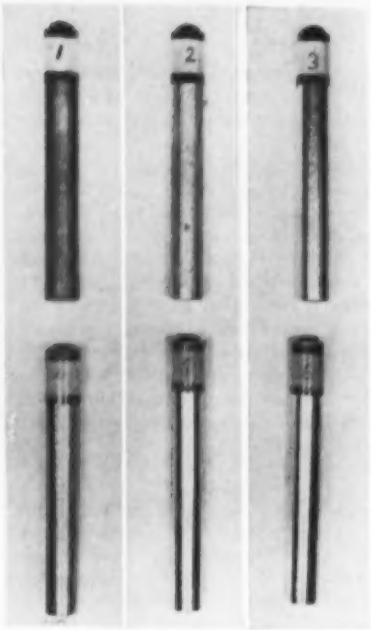
BRIGHT DIPS

The general purpose of any bright dip is an improvement of the appearance of the metal treated, an improvement achieved by the chemical polishing action of these dips. However, little is known about the actual surface produced on a given metal by such a dip, beyond the fact that the surface has higher reflectivity and is usually found to be somewhat more stain-resistant than the untreated surface. It is quite possible that bright dips in one case or another actually can do more than brighten and will have an effect on other operations to which the metal is subjected. Thus, bright dips of the type described in this article may have a possibly beneficial effect on subsequent coating, plating, drawing or forming operations and their evaluation should perhaps not stop with a reflectance measurement, but might be extended to include a study of bright dips as pretreatments to other operations.

Hydrogen peroxide in acid solution was found to be an efficient brightening agent, particularly to brighten zinc and cadmium surfaces, which are also made more stain-resistant by such a treatment. One bright dip treatment consists of a hydrogen peroxide solution acidified with sulfuric acid, pointing out that *p*H control

Martin Lapin, Chief Chemist (left), and Jack Weiner, Superintendent, of Henry Nelkin, Inc., discuss a nice point in plating procedure





(Top) Samples on the top row, Nos. 1, 2, and 3, show hard-rolled steel. Sample 1 is untreated. No. 2 has been treated with peroxide-bright dip and No. 3 has been pickled with sulfuric acid and then bright dipped. Nos. 4, 5, and 6 are cold rolled steel with treatments corresponding to Nos. 1, 2, and 3. The general purpose of each bright dip is an improvement of the appearance of the metal treated, an improvement achieved by the chemical polishing action of these dips. Although the degree of chemical polish obtained will depend on the original surface condition, special cleaning procedures do not seem required, and ordinary solvent degreasing of steel usually suffices

of the bath is very important. A recommended bath contains in water solution 4 per cent hydrogen peroxide and 0.25 per cent sulfuric acid by weight and is applied by immersing the article to be treated for about 15 seconds in the bath, followed by a water rinse.

Another bright dip for zinc employs a solution containing 2 to 5 per cent by weight of hydrogen peroxide together with either 2 to 5 per cent of sulfuric acid or 2 to 4 oz/gal of sodium cyanide.

BRIGHTENING AND PASSIVATION OF CADMIUM

Brightening and passivation of cadmium by means of acidic solutions of hydrogen peroxide can be accomplished with a solution containing hydrogen peroxide and sulfuric acid in specified ratio, the proper ratio of 4:1 being of greater importance than chemical concentration. Instead of sulfuric acid, potassium persulfate may be used in conjunction with hydrogen peroxide. It is quite possible that in such a bright dip the use of a peracid might bring certain advantages.

Still another bright dip for cadmium employs a solution containing per gallon of water 6 oz of hydrogen peroxide 30 per cent and 1 oz of concentrated sulfuric acid, or more generally a solution containing hydrogen peroxide and sulfuric acid in the ratio of about 1.6:1.

STEEL BRIGHT DIPS

One typical bright dip treatment for steel permits pickling or rust removal in such a manner that the exposed metal surface is left light and shiny, thus avoiding the need for mechanical finishing operations to improve surface appearance. It is an acid pickling process, employing acids such as sulfuric or phosphoric and others. However, the novelty of the process resides in the fact that a peroxygen compound is added to the pickling acid and this accounts for the satisfactory appearance of the surface directly after pickling and without further mechanical treatment. The following are typical examples of the pickling solutions used here:

1000 ml of water
25 g of cresol disulfonic acid
100 ml of hydrogen peroxide 30%

850 ml of water
150 ml of sulfuric acid D 1.84
400 ml of hydrogen peroxide 30%

1000 ml of water
150 g of acid potassium oxalate
100 g of sodium perborate

Another highly efficient and quite economical steel bright dip is the Marshall procedure, which may be summarized as follows:

Aqueous solutions containing oxalic acid, hydrogen peroxide and sulfuric acid exert a pronounced smoothing action on ferrous alloys, amounting with mild steel and white heat malleable cast iron to a considerable degree of polish. A suitable solution contains:

Oxalic acid (crystals)
2.5 gm per 100 ml
Hydrogen peroxide 100%
1.3 gm per 100 ml
Sulfuric acid
0.01 gm per 100 ml

The rate of attack upon mild steel is approximately 0.4×10^{-3} in per hour at room temperature. Complete smoothing of ground textures of 40 and 20 micro inches has not been achieved, but results indicate that finer textures may be more completely smoothed. Very strong adhesion of electrodeposited nickel to treated steel has been obtained, typical values being of the order of 50 tons per sq in. Steel smoothed in the solution becomes covered with a protective film which markedly inhibits rusting and permits considerable delay between etching and commencement of electrodeposition without impairing adhesion.

The films produced by Marshall's procedure have been found to be a continuous oxide layer about 60 Å thick. After being cathodically reduced, it appears to be reformed on exposure to air.

The effects claimed are readily produced by following Marshall's procedure using immersion times of about 20 minutes. Although the degree of chemical polish obtained will of course depend on the original surface condition, special cleaning procedures do not seem required and ordinary solvent degreasing of steel usually suffices. On small hardware items, such as screws, bolts and the like, a very pleasing appearance is secured with solvent degreasing followed by the above described dip. Prompt rinsing with water

The automatic plating process. Woman at left racks and hangs small parts on long horizontal member which rises and falls, immersing the racked parts, in the various baths required for nickel plating of steel parts. Woman at right is drying the finished parts in treated sawdust

and prompt drying after the water rinse are, however, essential.

ALUMINUM BRIGHT DIPS

An interesting bright dip method for aluminum and aluminum alloys is given in a patent by Vereinigte Aluminum Werke. In this patent various chemical polishing treatments for aluminum involving peroxygen compounds are mentioned and also a method to produce oxide films on aluminum and its alloys by treatment with a hot, aqueous solution containing ammonia and ammonium persulfate. If the metal is carefully prepared, reflectant oxide layers are said to be formed by this treatment.

A bright dip involving hydrogen peroxide, phosphoric and nitric acid is also described. This might be hazardous to use because of possibly violent reaction between the nitric acid and the hydrogen peroxide.

The treatment claimed by the patent, however, utilizes a solution containing phosphoric acid and hydrogen peroxide, either in form of a chemical or in form of an electrolytic bright dip. The chemical bright dip is applied to aluminum or high aluminum alloys by immersing the metal for two to three minutes in the solution, which is kept at a temperature of 90–100° C. The solution is made up by mixing 1 liter of phosphoric acid (d = 1.6) with 50 milliliter of 30 per cent hydrogen peroxide. No precleaning of the metal is said to be required and highly reflective surfaces are obtained.

Brightening of aluminum alloys (Al-Mn, Al-Mg and Al-Mg-Si) is preferably carried out electrolytically with a solution obtained by mixing 1 liter orthophosphoric acid (d = 1.7) with 50 milliliter of 30 per cent hydrogen peroxide. The metal to be treated is made the anode. Bath current is 11 volt at 1.5 amp/dm², treatment time is 5 minutes at room temperature. Al-Cu-Mg alloys are treated in the same electrolyte at 4 volt and 10–12 amp/dm² at 70–80° C for about ½ to 1 minute.

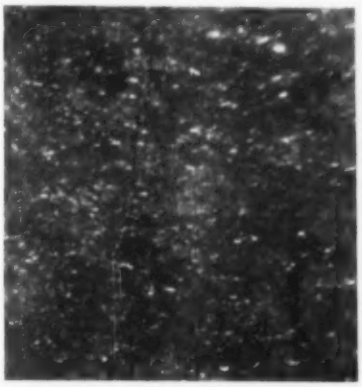
BRIGHT DIP FOR LOW SILICON CONTENT ALUMINUM AND ALLOYS

A similar chemical bright dip for aluminum and aluminum alloys of low silicon content is one wherein the aluminum articles, after solvent cleaning, are immersed for ¼ to 5 minutes time in a solution kept at about 90° C and containing 75 per cent phosphoric acid, 3.5 per cent hydrogen peroxide and 21.5 per cent water by weight. The water content is apparently critical and should not vary greatly, although a range of water concentration from about 20 per cent to 25 per cent by weight seems permissible. The treatment is said to give at least a 60 per cent increase in surface reflectance.

BRASS BRIGHT DIPS

Chemical brightening of brass and removal of so-called copper stains is commonly carried out by means of chromate-sulfuric acid pickling. Practically the same effects can be achieved without the use of the often objectionable chromate treatment by employing an acetic acid solution of hydrogen peroxide. This solution is made up by dissolving in water 5 per cent hydrogen peroxide and 5 per cent glacial acetic acid. The metal is treated by immersion at room temperature for about one hour. Higher concentrations and higher temperatures permit shorter treating times. A clean, bright surface is obtained.

If an etched appearance of the brass surface is desired, treatment with an acid solution of a persulfate is suggested. The solution might contain from 1–5 per cent of ammonium or potassium persulfate, with or without sulfuric acid, and is applied for about one hour at room temperature.



Bottom shows a microphotograph of steel finished with the Marshall bright dip method. Top shows a microphotograph of untreated specimen. Micrographs were taken with side-lighting so that high spots will on the metal surface reflect light. Therefore, the white spots on the photo correspond to surface irregularities. The smoother surface of the treated iron has fewer light spots than the original rougher steel surface. The Marshall procedure permits pickling or rust removal in such a manner that the exposed metal surface is left light and shiny, thus avoiding the need for mechanical finishing operations to improve surface appearance. Aqueous solutions containing oxalic acid, hydrogen peroxide and sulfuric acid exert a pronounced smoothing action on ferrous alloys, amounting with mild steel and white hearth malleable cast iron to a considerable degree of polish

SURFACE CLEANING OF PRECIOUS METALS

Two surface cleaning procedures designed for cleaning precious metals may be mentioned here, both of which make use of peroxygen compounds.

A method to remove so-called fire film from silver alloys, particularly those containing copper, offers certain advantages over the usual acid pickling, cyanide dips or mechanical brushing operations. Moreover, the process gives a particularly bright silver surface and is therefore of interest even in those cases where no "fire film" or the like has to be removed.

In this process the articles are first hot dipped in dilute sulfuric acid, then treated with a nitric acid dip. Thereafter follows at least one dip in a very dilute hydrogen peroxide solution containing minor amounts of sodium cyanide, still another dip in a dilute sodium cyanide solution and finally a wash with dilute ammonia and soap.

Although a number of steps are involved here, the individual dips are of very short duration and a substantial amount of work can be handled in a short time.

Another cleaning and brightening method suitable for manufactured jewelry parts and the like is a nonelectrolytic process, permitting handling of the parts in baskets and producing the desired effects by means of very short dips.

In this process the work, after a preliminary pickle, is immersed for a few minutes at room temperature in a solution containing hydrogen peroxide and sodium cyanide to remove surface film. This is followed by a standard cyanide dip, after which the work is dipped in a solution containing sodium perborate or equivalent hydrogen peroxide and metaborate, and sodium cyanide. An example of the first dip is:

Water	3½ g
Sodium cyanide	6 oz by weight
Hydrogen peroxide 35%	700 ml

A typical example of the second dip is:

Water	3½ g
Sodium perborate	4 oz by weight
Sodium cyanide	2 oz by weight

PASSIVATION OF FERROUS METALS AND CHROMIUM

More recently information has become available which indicates that peroxygen compounds may very well be useful in combating corrosion of ferrous metals and of chromium. Several instances of successful use of peroxygen compounds will be described here, two of which pertain to inhibitor systems and two to passivation of the metal surface by film formation prior to exposure to corrosive media.

Miscellaneous fixtures are lacquered to give various tints to the plated finish

INHIBITORS

Phosphate and an oxidizing agent in combination can be used to inhibit corrosion of mild steel by corrosive waters. The inhibitor combination is such that the primary corrosion product is a crystalline ferric phosphate and not ferrous phosphate, which is apt to prevent interaction between metal surface and inhibitor by forming more or less impervious membranes at the point of first attack. If the phosphate and the oxidizing agent are present in the correct ratio, the inhibitor system seems to be safe and efficient. Even if insufficient inhibitor is present, corrosion, although not prevented, is not intensified. Chromates are not the only operative oxidizing agent. Persulfates function as well and have the advantage of being harmless from the standpoint of health hazards and waste disposal, contrary to the hazards, etc., connected with the use of chromates. A typical experiment with a persulfate/phosphate inhibitor may be given here:

This experiment was made by half immersing abraded mild steel strips in 0.1 molar potassium chloride solution at room temperature. Under these conditions effective inhibition resulted from adding to the test solution:

0.0029 mol/l $K_2S_2O_8$
0.025 mol/l KH_2PO_4
0.025 mol/l Na_2HPO_4

No attack was observed over a 12-day test period, but quite distinct temper colors appeared on the specimens.

The implications are of interest and indicate that chromate-free, safe and efficient inhibitors comprising a persulfate and a phosphate are a definite possibility.

A recent practical experience is proof that peroxygen compounds under certain conditions can function as very efficient corrosion inhibitors. In this particular case hydrogen peroxide was used as the sole inhibitor to protect a chromium, polished to a high mirror-finish, which, in a certain manufacturing process, came in contact with a very dilute sulfuric acid solution. This caused loss of passivity and objectionable attack of the mirror-finish. The nature of the manufacturing process did not permit the use of more common oxidizing inhibitors, such as nitric acid or chromates. Hydrogen peroxide, however, was fully compatible with process requirements and satisfactorily prevented chromium corrosion when added in certain very low proportions to the process solution. In this and related cases the fact that hydrogen peroxide is a truly residue-less oxidizing agent is of course also of interest.

SURFACE PASSIVATION

An interesting example of preventing corrosion of steel by means of a specific oxidizing pretreatment of the metal surface is one in which the treated steel articles show no rust formation during 100-hour immersion in sodium chloride solution. The steel articles were first immersed in a 2 per cent solution of sodium thiosulfate containing 0.5 per cent ammonium persulfate by weight of solution. Immersion was for a short time only at room temperature. The work was removed, rinsed with water and immersed in a solution of potassium dichromate containing minor amounts of sodium thiosulfate, or immersed in a solution of potassium chromate containing sodium thiosulfate and an oxidizing agent, such as ammonium persulfate.

PASSIVATION OF STAINLESS STEEL

Although stainless steels are generally resistant to various chemical solutions, they are attacked to an extent by solutions containing active chlorine. This attack is prevented by treating the stainless steel at room or elevated temperature with a solution of a persulfate. An aqueous solution containing about 1 to 2 g/l of potassium persulfate is used for 8 to 48 hours at room temperature or for about 6 to 8 hours at temperatures between about 50 and 80° C.

Also worth mentioning is an investigation on passivation of stainless steel, especially of the 18-8-S type. The relative resistance of the surface films produced on the stainless steel was measured by immersing the specimens in 0.1 N sodium chlorine solution, imposing controlled potentials across the film and determining break-through potentials. Chemical treatment to passivate the surface was done by 30-minute immersion at 60° C in solution of nitric acid and/or hydrogen peroxide. Fairly high break-through potentials were observed after treatment with hydrogen peroxide 30 per cent alone, or in combination with nitric acid. Although these films do not offer lasting protection to stainless steel immersed in media which corrode the unpassivated metal, the information developed by this investigation on production and properties of such films might be of practical value in specific cases.

The principle illustrated by those examples may be applicable to many other cases, although modifications will be necessary to fit various operating conditions.

Margulies

DR. PAUL H. MARGULIES has been engaged in the manufacture and use of peroxygen chemicals since 1925 following his award of a Ph.D. in 1924 from the University of Vienna. Most recently, he has been active in the development of specific markets for peroxygen compounds manufactured by Becco Chemical Division, Food Machinery & Chemical Corporation, where he is also in charge of technical information. Dr. Margulies is a member of the ACS and in his spare time indulges in reading and music. He and his wife, Elizabeth, reside at 1015 Eggert Road, Eggertsville, New York.

Article References

Listed below is a compendium of articles of more than passing interest which have appeared recently in U. S. technical and trade magazines. The reader may obtain complete tear sheets of most of these articles by circling the appropriate numbers on the Reader's Service Card.

Dr. Samuel Heiman
AES Second Vice-President

32. ALUMINUM AND MAGNESIUM FINISHES

a. *THEORY OF THE KINETICS OF FORMATION OF ANODE FILMS AT HIGH FIELDS*
J. F. Dewald
J. Electrochem. Soc., Vol. 102, Jan. 1955, p. 1

b. *FINISHING PARTS FOR MILITARY AIRPLANES*
L. M. Redinbaugh
Industrial Finishing, Vol. 31, Dec. 1954, p. 36

c. *PAINTING OF ALUMINUM AND MAGNESIUM*
R. I. Wray
Metal Progress, Vol. 66, Dec. 1954, p. 121

d. *SURFACE TREATMENT AND FINISHING OF LIGHT METALS, PART V—CHEMICAL CONVERSION COATINGS (III)*
S. Wernick and R. Pinner
Metal Finishing, Vol. 53, No. 3, March 1955, p. 73

e. *HAE COATING VARIATIONS*
H. A. Evangelides
Magnesium, Aug. 1954, p. 5

f. *A NEW METHOD OF PROTECTING MAGNESIUM*
R. Stricklen
Precision Metal Molding, Vol. 12, Aug. 1954, p. 59

33. CHROMIUM

a. *HARD CHROME PLATE PAYS UNEXPECTED DIVIDENDS*
W. White and M. McKean
American Machinist, Vol. 98, Aug. 16, 1954, p. 142

34. CLEANING AND PICKLING

a. *LIQUID ABRASIVE BLASTING OF SPRINGS*
H. J. Steel
Machinery, Vol. 61, Jan. 1955, p. 188

b. *INHIBITED ACIDS IN PLATING CYCLES*
J. W. Carroll
Metal Finishing, Vol. 55, March 1955, p. 60

c. *CONTINUOUS PICKLING STAINLESS STEEL*
F. F. Jaray
Metal Finishing, Vol. 53, March 1955, p. 68

35. CORROSION

a. *EFFECT OF OXYGEN, CHLORIDES, AND CALCIUM ION ON CORROSION OF IRON BY POLYPHOSPHATES*
H. H. Uhlig, D. N. Triadis, and M. Stern
J. Electrochem. Soc., Vol. 102, Feb. 1955, p. 59

b. *EXTERNAL EXCHANGERS STEM CHEMICAL AND ELECTROLYTIC CORROSION*
C. Buck
Iron Age, Vol. 174, Dec. 30, 1954, p. 50

c. *METALLIZING FOR CORROSION PREVENTION*
A. P. Shepard and R. V. McWaters
Corrosion, Vol. 11, March 1955, p. 115t

36. EDUCATION

a. *SCIENCE FOR ELECTROPLATERS*
L. Serota
Metal Finishing, Vol. 55, March 1955, p. 78

37. FILTRATION

a. *THE USE OF FILTERS IN ELECTROPLATING*
J. B. Mohler and C. E. Crowley
Metal Finishing, Vol. 53, No. 2, Feb. 1955, p. 52

38. NICKEL

a. *CHEMICAL NICKEL COATING BOON TO PROCESS EQUIPMENT*
R. W. Glasheen
Chemical Engineering Process, Vol. 51, January 1955, p. 60

b. *ELECTROLESS NICKEL PLATING EVALUATED*
J. Haas
American Machinist, March 14, 1955, p. 158

39. PLANT LAYOUT

a. *HOW TO LAY OUT HEAT-TREATING AND PLATING DEPARTMENTS*
R. Trusler
American Machinist, Vol. 99, March 28, 1955, p. 125

40. PRECIOUS METALS

a. *ELECTROPLATED APPLICATIONS FOR PRECIOUS METALS*
I. Cross and P. J. Sloane
Electrical Manufacturing, Vol. 55, Jan. 1955, p. 96

b. *GENERAL MOTORS USES GOLD PLATED TRIM*
Products Finishing, Vol. 19, Feb. 1955, p. 36

41. SELECTION OF ELECTRODEPOSITS

a. *WHICH ELECTROPLATE?*
J. B. Mohler
Machine Design, Vol. 27, Jan. 1955, p. 179

b. *ELECTROPLATING FOR SHELF LIFE*
J. B. Mohler
Metal Finishing, Vol. 55, March 1955, p. 64

42. SPECIAL COATINGS

a. *ELECTRODEPOSITION OF CELLULOSE*
C. L. Mantell and F. Cozzarelli
J. Electrochem. Soc., Vol. 102, March 1955, p. 110

b. *VACUUM METALLIZING—NEW LOW-COST METHOD OF FINISHING METAL PRODUCTS*
J. Gordon Seiter
Machine and Tool Blue Book, Vol. 49, Dec. 1954, p. 157

c. *DEPOSITION OF TITANIUM COATINGS FROM PYROSOLS*
A. W. Schlechten, M. E. Straumanis and C. B. Gill
J. Electrochem. Soc., Vol. 102, Feb. 1955, p. 81

d. *ELECTROLYTIC PREPARATION OF MOLYBDENUM FROM FUSED SALTS, IV*
S. Senderoff and R. J. Labrie
J. Electrochem. Soc., Vol. 102, Feb. 1955, p. 77

43. SURFACE TREATMENTS

a. *FINISH EFFECTS OBTAINABLE ON STAINLESS STEELS*
R. E. Paret
Electrical Manufacturing, Vol. 55, Jan. 1955, p. 70

b. *STEAM OXIDIZING PROVIDES BETTER PAINT BASE*
L. E. Raymond
Iron Age, Vol. 175, Jan. 13, 1955, p. 75

c. *STEEL-CONTAINER TREATMENTS. II*
L. J. Nowacki, E. R. Mueller, and R. H. Dent
Modern Packaging, Vol. 28, Dec. 1954, p. 145

44. TESTING

a. *THE FIVE PER CENT SALT SPRAY TEST AND ITS ACETIC ACID MODIFICATION*
W. D. McMaster
ASTM Bulletin, No. 203, Jan. 1955, p. 62

45. TIN

a. *DISPLACEMENT TINNING OF ALUMINUM*
Tin and Its Uses, 1954, No. 30, p. 8

Patent Abstracts

DR. D. GARDNER FOULKE

Manager, Electrochemical Development
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Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,687,345—Etching Composition for Lithographic Plates—M. H. Murray, assignor to Printing Developments, Inc., New York, N. Y.—August 24, 1954.

A composition capable of etching chromium and adapted for use in the preparation of offset printing of bimetal lithographic plates having a chromium surface is claimed. The solution consists of hydrochloric acid in an amount to etch chromium, calcium chloride of at least 80 per cent to inhibit the attack of the resist and a polyhydric alcohol containing 2–4 carbon atoms in the amount of 5 per cent to prevent crystallization of the calcium chloride.

2 claims.

–AES–

No. 2,687,361—Metal Coating Recording Medium—E. Traub, assignor to Robert Bach, G. m. b. H., Stuttgart, Germany, August 24, 1954.

A method is claimed to prevent corrosion of recording strips by varnishing both sides of a paper (or other) strip, then evaporating a cadmium layer on one side.

1 claim.

–AES–

No. 2,687,362—Soldering Flux Composition—W. H. Ruggeberg, assignor to Tennessee Corporation, New York, N. Y., August 24, 1954.

The composition claimed consists essentially of alkanolammonium salt of an alkyl benzene sulfonic acid having not more than 18 carbons in the alkyl side chain. In the preparation the alkanolamine, primary, secondary and tertiary ethanol– and iso-propanolamines, is used in excess, with 1½ to 3 mols to a mol of acid.

12 claims.

–AES–

No. 2,687,602—Buffing Wheel—G. R. Churchill, Cohasset, Mass., August 31, 1954.

An improvement upon the buffing wheel described in U. S. Patent No. 2,146,284 is claimed. Each buffing element is made up of a relatively short length of cloth folded to produce a multiple-ply element which is itself folded longitudinally so it has wings extending circumferentially and is substantially V-shaped (or N-shaped) in cross section.

2 claims, 12 figures.

–AES–

No. 2,687,993—Method of Electrocoating—G. C. Cox—Charleston, W. Va., August 31, 1954.

A process is described for forming a firmly bonded electrocoating on the surface of a ferrous metal which is in contact with an electrolyte essentially composed of sea water. The *p*H is adjusted to 2.8–4.1 with a mineral acid, iron salts added to provide a soluble iron content of 0.02 per cent to 0.4 per cent, then the object is made cathodic at a current density sufficient to deposit a firmly adherent coating consisting of water insoluble compounds of iron, magnesium and calcium. In the disclosure 30–400 milliamperes per square foot are mentioned. The second claim includes descaling as well as electrocoating wherein the object is first treated at a *p*H of 1.1 to 2.8 and, when the *p*H becomes 2.8, it is made cathodic to electrocoat. The coating can be densified by raising the *p*H to 4.1 to 5.5 and continuing the cathodic treatment. See also U. S. Patent No. 2,200,469.

2 claims.

–AES–

No. 2,687,994—Method of Forming an Oxide Coating on Tin—J. J. Russell and H. N. Nestor, assignors to Ekco Products Co., Chicago, Ill.—August 31, 1954.

In forming a heat absorbing tin oxide coating on a tin article the article is made the anode in a solution containing an organic acid or an inorganic complexing agent (also fused salt), then removed and heated at 190–230° C to convert the oxide to the green oxide of tin. Claims for the organic acids cover *p*H of 2 to 7 and a temperature of 60° C. The organic acids may be poly-basic as tartaric or monobasic as acetic, lactic, etc.; while the inorganic compounds may be phosphates, borates, etc. Typical baths are:

Na_2HPO_4	3–15 per cent by wt.
H_3PO_4 85 per cent	2–5 per cent by wt.

or

$K_2C_4H_4O_6$	5–25 per cent by wt.
$H_2C_4H_4O_6$	1– 3 per cent by wt.

Current densities disclosed are 15–20 asf.

24 Claims.

–AES–

No. 2,688,031—Hydroxylation of Fatty Materials—R. L. Logan, assignor to Kessler Chemical Co., Inc., Philadelphia, Pa., August 31, 1954.

A method is claimed for converting unsaturated fatty materials having 11–22 carbon atoms to polyhydroxy compounds by subjecting to anodic oxidation in a cell containing an aqueous sulfuric acid, 65–75 per cent, to form persulfuric acid. The latter immediately reacts with the fatty material at 10° C to 50° C and is subsequently hydrolyzed.

7 claims, 2 figures.

–AES–

No. 2,689,785—Method for Chemically Polishing Lead—A. Simon, assignor to United States of America, September 21, 1954.

The method depends upon the immersion of the clean lead article in an aqueous solution of acetic acid (15–70 per cent) and hydrogen peroxide (10–25 per cent) followed by acetic acid and water rinses. The example gives the acetic acid as 50 per cent and the hydrogen peroxide as 15 per cent.

2 claims.

–AES–

No. 2,689,808—Metal Plating—E. Clayton, assignor to Peen Plate, Inc., Baltimore, Md., September 21, 1954.

The method consists of agitating metal articles with metal powder and an organic film-forming, plating agent in aqueous suspension. As the result of the metal articles pressing against one another in a tumbling barrel, for example, the metal powder is deposited as a dense film. This patent describes a batch treatment wherein the used aqueous solution of film former (0.1–2.0 per cent by weight) and suspension of metal powder (no more than 20 per cent left) is thrown away.

Zinc dust, tin powder and lead coated zinc grit are described as the metal powders and carboxymethyl cellulose, an eighteen carbon chain tertiary amide, sodium algenate and starch are disclosed as film-forming plating agents. See also United States Patent **2,640,001.**

4 claims.

–AES–

No. 2,690,401—Chemical Nickel Plating on Nonmetallic Materials—G. Gutzeit, W. Crehan and A. Kreig, assignors to General American Transportation Co., Chicago, September 28, 1954.

The first step of the process produces a catalytic surface on nonconductors such as plastics by imbedding iron, cobalt, nickel, aluminum, copper, silver, gold, palladium and platinum

Patent Abstracts

or compounding with the plastic or by tumbling, etc. The plating is then done in an electroless nickel bath, i.e., a nickel salt plus hypophosphite.

9 claims, 2 figures.

-AES-

See also **No. 2,690,402** (8 claims) describing the reduction of a palladium salt to metallic palladium on nonmetallic materials, and **No. 2,690,403** (6 claims) describing carbon particles incorporated in the nonconductor and exposed on the surface as prior treatments before the deposition of electroless nickel.

-AES-

No. 2,690,996—Electroplating of Nickel—Henry Brown, assignor to The Udylite Corporation, Detroit, Mich., October 5, 1954.

Reduction of the grain size and the improvement of the luster of nickel electrodeposits is disclosed by the use of not more than 0.5 per cent of at least one bath-soluble ester having the formula R–C–OX, where R–C– is the acyl radical of an unsatu-

rated aliphatic monocarboxylic acid containing not more than 6 carbon atoms and the unsaturation of which is due to double bonds, and X is methyl, ethyl, 2-methoxyethyl, 2-ethoxyethyl, 2-(B-methoxy) ethyl, phenyl or 2-phenoxyethyl. Several compounds covered are 2-methoxyethyl acrylate and 2-ethoxyethyl acrylate. Baths containing the chloride, sulfate, sulfamate and fluoborate of nickel as well as mixtures are covered as is the use of sulfo-oxygen compounds such as aryl sulfonic acids, amides, etc., in conjunction with the aforesnid esters.

21 claims.

-AES-

No. 2,690,997—Electrodeposition of Copper—G. Jernstedt, assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., October 5, 1954.

A cyanide copper plating electrolyte is claimed containing 2 to 15 oz/gal of copper, free alkali cyanide of 0.5 to 5 oz/gal, 2 to 12 oz/gal of alkali metal hydroxide, 1 to 20 oz/gal of alkali metal carbonate and 0.01 to 0.4 oz/gal of lithium. This formulation is also claimed in conjunction with 0.004 to 0.57 oz/gal of zinc or 0.1 to 10 oz/gal of thiocyanate as well as the latter two in combination and in conjunction with periodic reverse plating.

9 claims.

-AES-

No. 2,692,187—Method of Pickling—A. E. Chester, assignor to Poor & Company, Chicago, Ill., October 19, 1954.

A process for conditioning metal surfaces by immersion in an acid pickling bath containing chromium aldonate and a compound capable of liberating elemental colloidal sulfur supplying compound (e.g., sodium thiosulfate) is held low so the sulfur will remain dispersed in colloidal form (1–8 parts/5000 parts of acid).

14 claims.

-AES-

No. 2,692,188—Acid Pickling Composition—A. E. Chester, assignor to Poor and Company, Chicago, Ill., October 19, 1954.

Similar to **No. 2,692,187.** In this patent a water soluble ionizable thiocyanate and a compound capable of liberating colloidal sulfur are claimed as addition agents to pickling solutions. Claim 14 specifies the quantity of sodium thiocyanate as 3 to 10 times the weight of the sodium thiosulfate which is the sulfur-liberating compound.

14 claims.

No. 2,693,121—Method of Making Aluminum-Lined Steel-Backed Bearing Material—J. Dight, assignor to Johnson Bronze Co., New Castle, Pa., November 2, 1954.

A method for making composite aluminum-lined, steel-backed bearing material by placing an aluminum strip on a steel strip, both being smooth where they contact, heating and rolling to reduce the thickness of the aluminum strip and bond to the steel strip while confining the edges of the aluminum strip during the rolling.

3 claims, figure.

-AES-

No. 2,692,236—Nonsoap Detergent Compositions Containing Antitarnishing Agents—W. Sweet and W. Mead, assignors to Colgate-Palmolive Co., Jersey City, October 19, 1954.

A detergent composition normally tending in water to tarnish copper base alloys, consisting essentially of inorganic polyphosphates is claimed to be nontarnishing if dibutyl thiourea is added. The use of wetting agents therewith is also covered.

15 claims.

-AES-

No. 2,692,458—Apparatus for Cleaning and Descaling Tubular Articles by Abrasive Blasting—E. E. Laurence, assigned to U. S. Steel Corp., October 26, 1954.

This apparatus is designed to permit rotation of cylindrical work pieces within a blast of abrasive.

25 claims, figure.

-AES-

No. 2,692,459—Sheet Burring Machine—G. Gerung, Miami, Fla., October 26, 1954.

The machine described provides means for carrying a sheet of metal between two sheets of abrasive carried on adjustable tables above and below the metal sheet.

3 claims, figure.

-AES-

No. 2,692,836—Method of Increasing the Electrical Conductivity of Tin Oxide Films—J. McAuley, assignor to Libby-Owens-Ford Glass Co., Toledo, Ohio, October 26, 1954.

A method for producing transparent electrically conductive films, consisting essentially of tin oxide, is claimed possible by applying a film forming tin compound (e.g., stannic tetrachloride) to which has been added a tellurium or tungsten compound (0.0001 to 0.4 per cent or 1.5 per cent, respectively) to a hot vitreous surface.

10 claims.

-AES-

No. 2,692,850—Aluminum Electroforming—W. Safranek, W. Schickner and C. Faust, assignors to The Battelle Development Corporation, Columbus, Ohio, October 26, 1954.

The method involves forming a fusion of about 2 mols of aluminum chloride and 1 mol of ethyl pyridinium bromide, making a bath by dissolving the fusion in toluene (the latter in sufficient amount to provide an excess layer of 23–45 per cent of the total volume), adding an addition agent such as methyl tertiary butyl ether, ethyl ether or diphenyl oxide and electrolyzing using an aluminum anode and a conductive cathode while bubbling an inert gas through the bath. The broader claim covers an aluminum kalide, a quaternary salt of nitrogen and an aromatic solvent and the addition agents mentioned above.

8 claims.

-AES-

No. 2,693,064—Method of Making Buffing Wheels—C. A. Lyon, Detroit, November 2, 1954.

A method of forming buffing wheels wherein the elongated strip form of material is folded over a cable in layers and the opposite side portions of said layers are folded toward one another about said cable to form pleats.

5 claims, figure.

Books

Order all books AES, 445 Broad Street, Newark, N. J. Please remit check or money order.

1955 Finishing Handbook and Directory: edited by I. S. Hallows, Sawell Publications Ltd., (London) 484 pp. Thirty-seven shillings and sixpence (including twelve monthly issues of "Product Finishing".) (This is equal roughly to $5.60 with postage extra.)

The fifth edition of this handbook and directory for the finishing methods and materials has undergone a number of changes. In particular, the following sections on finishing materials have been added to the handbook, which now extends to 294 pages.

Chief Types of Paint: including: oil paints; oil varnishes; cellulose lacquers; cellulose thinners; synthetic resin based finishes.

Selection of Paint Schemes: including: finishes for wood; metal; plastics; and rubber.

Paint Application Methods: including: dip coating; flow coating; roller coating; barrel enamelling; centrifugal enamelling; spray painting; hot spraying; catalyst spraying; airless spraying; steam spraying; electrostatic spraying; automatic spraying.

Finishes for Aluminum Alloys: including: choice of finishes; mechanical preparation; cleaning processes; pretreatment before painting; painting methods; anodizing methods; electroplating methods.

Glossary of Finishing Terms: The directory of equipment, plant and materials used in the finishing field, of out-working firms and of trade and brand names, which extends to 192 pages, has been completely revised, a process which is felt to be justified by its value in providing much trade information not available from any other source. The section on finishing equipment, plant and materials has been divided into general classifications corresponding with sections in the handbook, such as preparatory treatments, paint application equipment and plant and supplies for electrolytic processes which is intended to make for easier reference. Other changes included the inclusion with each out-working firm's entry of information as to the other finishing processes carried out and the classification of these entries into geographical areas based on the main British industrial centers.

Collective Volume III of Organic Syntheses, edited by E. C. Horning. (John Wiley & Sons). 890 pp. $15.00 to nonmembers, $12.75 to members.

Collective Volume III of the well-known "Organic Syntheses" series was published in March by John Wiley & Sons. The new book encompasses all the material in Annual Volumes 20-29, revised and brought up to date with new and improved methods of preparation.

Generally standardized along the lines of individual volumes, the collective volume nevertheless takes into account pertinent information not available at the time of original printings. Errors found in the original books have been corrected; calculations and references have been checked; and modifications and improvements brought to the attention of the Editorial Board have been included. Seven new and improved checked procedures appear in this volume.

The section on "Methods of Preparation" to be found under each preparation has been systematically revised to include additional methods of preparative value found in the literature covered by *Chemical Abstracts* through Volume 46. Later references are also included for a number of preparations. The *Chemical Abstracts* indexing name for each preparation is given as a subtitle when that name is different from the title.

The Editorial Board consists of E. C. Horning, C. F. H. Allen, N. L. Drake, C. S. Hamilton, R. L. Shriner, L. I. Smith, H. R. Snyder and Norman Rabjohn, Secretary.

The Advisory Board for the series includes: Roger Adams, A. H. Blatt, H. T. Clarke, J. B. Conant, L. F. Fieser, R. C. Fuson, Henry Gilman, W. W. Hartman, John R. Johnson, Oliver Kamm, C. S. Marvel, and C. R. Noller.

1954 Supplements to Book of ASTM Standards. Heavy paper covers; 7 parts; $3.50 per part to nonmembers, $3.15 to members; $24.50 per set to nonmembers, $22.10 to members.

Part 1. Ferrous Metals—608 pages. Includes 89 standards covering steel pipe (welded and seamless, high temperature service, stainless, etc.); steel tubes (boiler, superheater, heat exchanger, refinery service, general service, etc.); bolting materials; etc.

Part 2. Non-Ferrous Metals—444 pages. Includes 81 standards covering metallic electrical conductors; copper and copper-base alloys; aluminum and aluminum-base alloys; magnesium and magnesium-base alloys; electrical heating; resistance and related alloys for radio tubes, electronic devices, and lamps; metal powders; *electrodeposited metallic coatings;* corrosion tests and general methods of testing.

Part 3. Cement, Concrete, Ceramics, Thermal Insulation, Road Materials, Waterproofing, Soils—416 pages. Includes 77 standards covering cement (portland, portland-pozzolan, magnesium oxychloride, and magnesiu moxysulfate); lime; gypsum; mortars (chemical resistant and masonry); etc.

Part 4. Paint, Naval Stores, Wood, Cellulose, Wax Polishes, Sandwich and Building Constructions, Fire Tests—160 pages. Includes 28 standards covering pigments; drying oils; paint driers and thinners; shellac and varnish; lacquer and lacquer materials; traffic paint (crushing resistance of glass spheres); printing inks (fineness of grind); general paint tests; paint weathering tests; naval stores; wood; wood preservatives; cellulose and cellulose derivatives; wax polishes; tests of building constructions; and fire tests.

Part 5. Fuels, Petroleum, Aromatic Hydrocarbons, Engine Antifreezes—308 pages. Includes 36 standards covering crude petroleum; butadiene; motor and aviation fuels; petroleum solvents and naphthas, etc.

Part 6. Rubber, Plastics, Electrical Insulation—532 pages. Includes 66 standards covering rubber products.

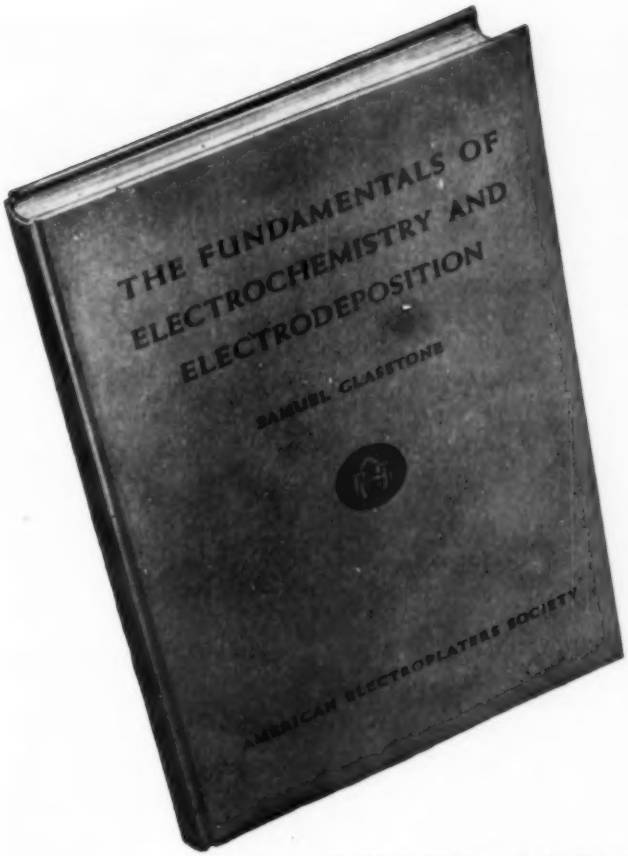
Part 7. Textiles, Soap, Water, Paper, Adhesive, Shipping Containers—296 pages. Includes 38 standards covering textile materials.

Statistical Analysis in Chemistry and the Chemical Industry by Carl A. Bennett and Norman L. Franklin, 1954, xvi + 724 pages. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price, $8.00 to non-members: $6.80 to members.

Although a great many books on statistics have been published in the last few years, this volume seems destined to find wide acceptance. It is a full and complete development of the methods which are likely to find use in the chemical and allied industries, and sufficient statistical mathematics for an adequate background is happily combined with well presented examples of practical applications.

The book is magnificently written, and those who want quick proof of this statement are referred to pages 538 to 580. Here the reader will find an unusually clear presentation on the principles of experimental design by the method known as confounding. This technique offers interesting possibilities in the field of electrochemical research, particularly electroplating, and it is a pity that others have not utilized it as fruitfully as the agricultural chemists.

The text is so closely integrated and interwoven that it is not suitable for casual reference and its full value can only be realized by full and careful reading. This is by no means a limitation; it is rather, a tribute to the high order of organization which the authors have achieved.



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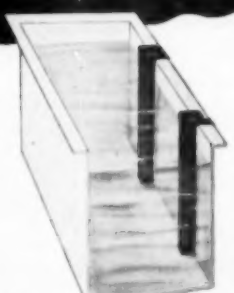

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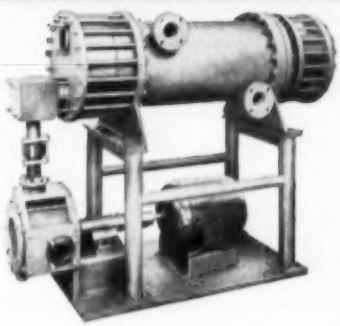

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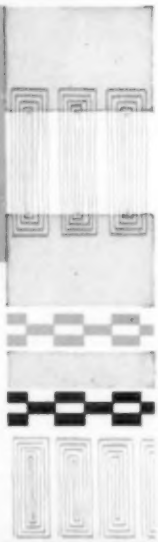

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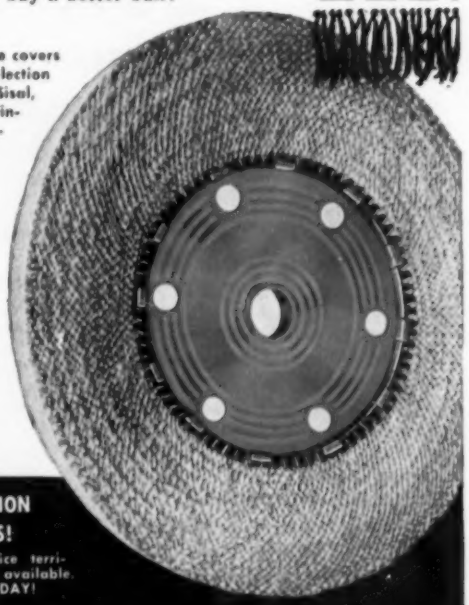

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Branch News

BALTIMORE-WASHINGTON

The annual educational session was called to order by president **Benderly** in the New York Room of the Statler Hotel, Washington, D. C., on March 12.

Dr. Vernon Lamb and **Vincen Hughes, Jr.,** were appointed to the nominating committee to present at the April meeting a slate of officers for the coming year.

Following a few remarks by Dr. **Schaefer** the meeting was turned over to librarian **Jules Horelick** who introduced the speakers for the evening. Dr. **H. C. Kellner,** Lea Mfg. Co., spoke on "Brite Copper Plating." **J. H. Hague,** Westinghouse Corp., discussed design, construction and operating characteristics of germanium rectifiers. Both of these speakers gave an excellent presentation of their respective subjects.

Walter Pinner, Houdaille-Hershey Corp., gave a splendid report on the work that has been and is being done to develop a reliable corrosion test for plated coatings.

The evening was spent dining and dancing with the ladies. The dinner was highlighted by the presentation of a Pot to President **Schaefer. Ken Huston,** Past President, AES, made the presentation. Out-of-town guests included: Mrs. **Ralph Schaefer,** wife of the National President, and Executive Secretary, **Peter Kovatis.**

CARL H. THIEDE
Secretary

BRIDGEPORT

The regular scheduled business meeting and educational session of the branch was held in the main ballroom of the Hotel Barnum on March 11. President **Philo Bailin** called the meeting to order at 8:25 P.M. with 49 members and guests present.

Applications for membership were received from **Paul Iannucci, Harry Simon, Frank W. Hightower, Albin Jocis** and **Lawrence French.** Two new members were accepted: **Edward Hill** and **Salvatore Puglisi.**

V. Consalvo, chairman of the May Dinner-Dance, reported that the affair would be held at the Fairfield Inn on Saturday, May 21, 1955. Complete details and announcements would be sent to the membership by mid-April.

The following members were nominated for the designated officers of the branch for the fiscal year 1955-1956: President, **Joe Simon;** 1st Vice-President, **Robert Bonazzo;** 2nd Vice-President, **George Eckholm** and **Floyd Tatum;** Secretary-Treasurer, **Robert Parker;** Librarian, **M. Tamas;** Sergeant-at-Arms, **Al Ferguson;** Board of Managers: **William Ehrencrona, H. Maskowski, H. Braun** and **Al Chenis.**

Librarian **F. Tatum** introduced the guest speaker of the evening, **Dr. Walter R. Meyer** of Enthone, Inc., who spoke on "Some Problems in Electroplating, Peeling, Pitting and Throwing Power." Dr. Meyer discussed the various factors that lead to high-bond strength or adhesion of electrodeposits including preparation of the base metal. Various causes of pitting as well as its cure were described. The many conditions that influence throwing power were discussed.

BOB PARKER,
Secretary-Treasurer

BUFFALO

The branch met March 4 at the Markeen Hotel in Buffalo, N. Y.

Ed Wallin, president of the Rochester branch, invited the members of the Buffalo branch to attend the Empire State Regional Meeting Saturday, April 16, 1955.

Joe Ruff announced the Annual Picnic will be on Saturday, July 30, 1955 at the Kendall Club on Chautauqua Lake (Route 17 west of Jamestown).

Four applications for membership were received and referred to the board of managers.

One member, **W. H. Beck,** was reinstated. Librarian **Robert Hofmann** gave a very interesting talk on "Protective Finishes and Galvanic Corrosion in the Aircraft Industry."

ERIC G. SAMPSON, JR.,
Secretary

CAPITOL DISTRICT

Forty-two members and guests met at Panetta's Restaurant, Menands, N. Y., March 7. **W. D. Jeffries,** technical representative, E. I. DuPont de Nemours, spoke on "A New Versatile Improvement in Cyanide Copper Plating," using color slides and charts to illustrate his talk. During the discussion period, which followed, Jeffries pointed out that this bath is probably not suited for oxidized copper.

Visiting from Syracuse were **Lindley S. Wood, Ed Hollister,** and **Hank Holbert.**

Norm Searles, outing committee chairman, announced that the Outing would be held at Carnevales Nite-Kap Inn, on Saratoga Lake, June 11.

New officers elected were: **Paul D. Callahan,** president; **Joseph G. Donadio,** 1st vice-president; **Leonard Brightman,** 2nd vice-president; **Charles Schenk,** secretary; **John Green,** treasurer; **Edward V. Raymond,** librarian; Board of Managers: **Frederick A. Infield, Ray Dunlevy, Herb James, Peter Greco.** Delegates to the National Convention: **Ted Infield, Ted Duvall, Peter Greco.** Alternates: **Norm Searles, Ed Raymond, Bob Hill.** Representatives to the Empire State Regional Meeting: **Paul D. Callahan, Ed Wheeler, Norm Searles.**

After the meeting refreshments were served with **Merle Shaw,** Diamond Alkali Co., as host.

P. D. CALLAHAN,
Secretary

(Bottom, left) HANDSOME GOLD PLATED POT presented to Dr. Ralph A. Schaefer, President of the AES by AES Past President Ken Huston of the Baltimore-Washington Branch, at that branch's annual meeting on March 12 at the Washington, D. C. Statler. Award is presented yearly by the Baltimore-Washington Branch to AES Presidents "for outstanding contributions to the Society." Left to right: W. L. Pinner, Schaefer, Huston and F. Fulforth. All are AES Past Presidents except Dr. Schaefer

Plating Staff Photo

(Bottom, right) PARTICIPANTS IN Baltimore-Washington Annual Meeting were (left to right): Branch President Asaf Benderly; AES Past President W. L. Pinner, speaker; Jules Horelick, educational chairman; AES President R. A. Schaefer; Dr. Henry Kellner, speaker; and C. S. Hague, speaker

Plating Staff Photo

Branch News

CHICAGO

In addition to reporting news of the regular monthly meeting, March 11, at the Western Society of Engineers, Chicago branch points with pride to the increasing interest in and response to a recently initiated program. Just prior to presentation of the guest speaker, a three-man panel of experts presided at a short question and answer session. Panel members and the subjects on which they will be prepared to answer questions are listed in the regular monthly meeting notice and members are invited to submit questions to be answered at the meeting.

Panel members and the subjects of discussion for the March meeting were: **Marvin Daniel,** Hot Point Electric, "Nickel-Chromium Finishes for Appliances and Coating"; **James Valone,** Frederick Gumm Chemical Co., "General Finishing and Cleaning"; **Jerome Kuderna,** Scientific Control Laboratories, "Plating on Aluminum and General Finishing Info."

After the question period, **Myron Ceresa** presented a talk on "Some Practical Aspects of P.R. Copper Plating." The members found his discussion very informative and of immediate help in some of their problems.

Chicagoans attending the ASTM B-8 Committee meetings at Cincinnati during the first week in February were: **Barney Case,** Sunbeam Corp.; **G. Gutzeit,** General American Transportation; **Russell Harr,** Western Electric; **E. A. Hodges,** Kocour Co.; **Ray Ledford,** Industrial Filter & Pump; **H. A. Kahler,** Promat Div. of Poor & Co.; **A. Weisberg,** Technic, Inc.

The candidates installed were elected by closed ballot at the March meeting. The slate presented by the nominating committee were: President, **S. P. Gary, Jr.**; 1st Vice-President, **Ralph Pettit**; 2nd and 3rd Vice-Presidents, **Charles McComb** and **James H. Connelly**; Librarian, **Russell Harr**; Secretary-Treasurer, **Paul Glab**; Board of Managers: **Ed Stanek,** Chairman; **Chas. Silhavy** and **Harold Bielenberg**; Delegates: **Clyde Kelly, Paul Glab** and **J. H. Monaweck**; Alternates: **Ovid Bedard, Willard Carter** and **Matt Dessinger.**

Secretary **Paul Glab** reported that the work of compiling data for a new Chicago Branch Membership Directory is almost complete. Glab also reminded Chicago members and friends that copies of presentations by speakers before Chicago branch are now available at a cost of $1.00 each.

JEROME KUDERNA,
Publicity

CLEVELAND

The March meeting of the Cleveland branch was held as usual in the Aviation Room of the Hotel Carter. President **Henry Friedberg** called the meeting to order at 8 P.M. and presided over approximately 75 members and guests.

Secretary **Bert Lupien** introduced **B. F. Lewis** of the Northwest Chemical Company, who gave a most informative talk on "Special Phases of Metal Cleaning."

Immediately after Lewis' presentation, the Cleveland branch elected the following people to membership: **A. F. Dailey, W. J. Foisel, L. C. Nicoulin, H. T. Parsons** and **R. E. Shope.**

Cochairman **Charles Ott,** of the National AES Convention, announced that a General Committee Meeting, in relation to the affairs of 1955 National Convention would be held on March 21, 1955. Ott reported that the coming exposition is substantially ahead of similar Chicago operations at a parallel time—and only 23 booths are left to be rented.

Final vote tally on the election of new branch officers, delegates and board of managers for 1955–1956 are as follows: **A. J. Lupian,** President; **A. H. DuRose,** 1st Vice-President; **E. J. Roehl,** 2nd Vice-President; **R. I. Peters,** Secretary-Treasurer; **M. Van Loan, Jr.,** Librarian; **J. B. Winters,** Assistant Librarian. Delegates: **Dr. Ralph Schaefer, Chas. Ott, E. L. Combs**; Alternates: **H. Blouch, H.**

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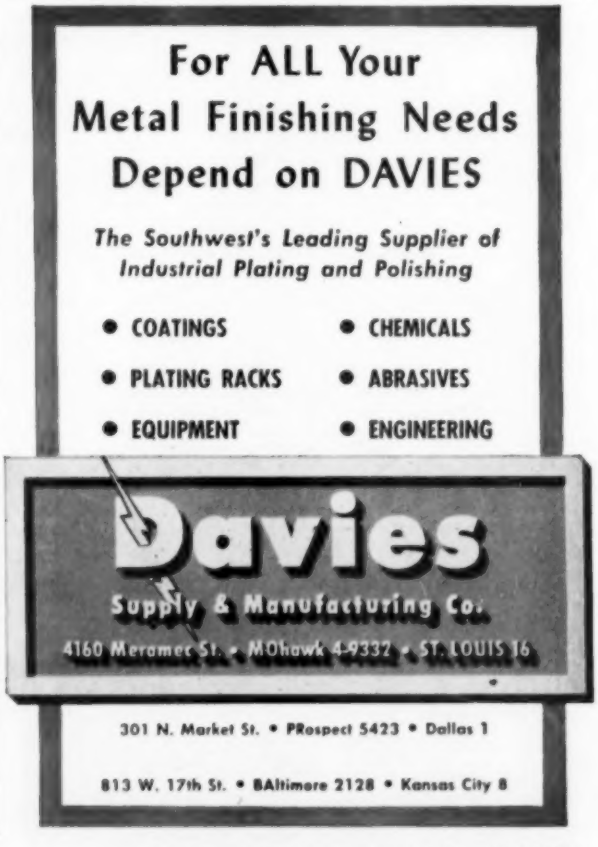
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Branch News

Friedberg, J. Bohovic. Board of Managers; **H. Pochapsky,** 1 year; **Jack Little,** 2 years; **H. Friedberg,** 3 years.

MORT VAN LOAN,
Assistant Librarian

COLUMBUS

The regular monthly meeting of the Columbus branch was held at Battelle Memorial Institute on Friday, March 4, at 8:00 P.M.

Tri-State Committee Chairman **Bill Safranek** reported further contributions by suppliers. Tri-State Ticket Chairman **John Beach** reported that approximately $1,000.00 has already been turned in for tickets, and asked that anyone desiring more tickets should contact him.

Program Chairman **Bill Neill** asked for a good turnout at the educational session, and promised interesting talks. Bill also announced that **Harvie Johnson** of Belke Mfg. Co., will be host at a cocktail party for the Columbus branch on March 26 at 5:00 P.M. at the Deshler Hilton Hotel. The party is to be in honor of Bill Neill.

Librarian Bill Neill introduced the speaker of the evening, **Lt. Sighs** of the Columbus Fire Dept., Fire Prevention Bureau, whose topic was "Industrial Fire Hazards." After an interesting talk, question and answer session, the speaker was accorded a round of applause.

Neill reported that arrangements have been made for a tour of the Columbus Sewage Treatment Plant in conjunction with the April meeting.

MICHAEL FARR, JR.,
Secretary-Treasurer

DALLAS-FORT WORTH

The regular meeting of the Dallas-Fort Worth branch was held on Wednesday evening, February 16, at the Lennox Hotel, Grand Prairie, Texas.

Eugene L. Combs, Diamond Alkali, gave a wonderful presentation of the activities for the Cleveland AES Convention to be held in June. Combs is general chairman of the convention and drummed up considerable interest among the members who attended the meeting and heard him talk. He also gave a very interesting resume of the manufacture of chromic and allied products.

A nominating committee was appointed to handle the nomination of officers' election to be held at the regular March meeting.

R. H. HEPPEL,
Publicity

DAYTON

The regular March meeting was held at the Biltmore Hotel. Two new members were elected: **Keith D. Ford,** Sales Engineer, United Chromium, Inc., and **Robert F. Welch,** foreman, Moraine Products Div., GMC.

The delegates and alternates elected to the convention are: **W. E. Moline, Fred Bauch** and **Ralph Collins**—delegates; **Robert Ruleff, Jack Baker** and **L. A. Critchfield**—Alternates.

Librarian **Holle Luechauer** introduced **A. W. Wendt,** Dayton member of Delco Products, Div. GMC., who discussed their recent experiences in converting a regular chromium bath to the United Chromium High Speed Self Regulating Bath. He explained that they are now able to cut the plating time in half and thus eliminate one shift.

J. W. Carroll, research chemist, Pennsylvania Salt and Manufacturing Co., spoke on "Acid Treatment Prior to Electroplating." He pointed out the advantages and disadvantages of using inhibitors

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Branch News

in acid pickling. The interest in this particular subject was shown by the extensive questions asked.

R. M. Clinehens,
Secretary

DETROIT

The meeting was held on March 4 in the Wayne Room of the Hotel Statler.

President **Joe Gurski** introduced the chairmen of the various committees and thanked them for the help they had given him during the year.

Bob Racine introduced the new members to the branch.

This was the annual ladies night and Gurski welcomed the ladies and expressed his appreciation for the huge turnout. This was the largest crowd of the year with about 350 present. There were at least 150 ladies present and Gurski expressed a desire to see twice this number next year.

The movie of the evening was a film on the Pan-American Road Race of 1955.

Fred Olmstead introduced the speaker of the evening, **Dr. Richard Saltonstall** of the Udylite Corporation. Saltonstall's topic of the evening was "Jewelry Plating." For the women in the audience Dr. Saltonstall explained briefly and in simple terms the process of electrodeposition of metals. Starting from the artist designs he traced the steps of the manufacturer through to the final plating operation.

Patrick J. Driscoll,
Publicity

FRIENDLY RIVALS. "Duke" Wysong (left) of St. Joseph Valley Branch, and Herb Head of Detroit Branch, aspirants to National Third Vice Presidency of the AES, exchange friendly greetings at recent Tri-State Regional meeting

GRAND RAPIDS

The Seventeenth Annual Educational Session and Dinner-Dance Party of the Grand Rapids branch held February 19, 1955, at the Pantlind Hotel was a very successful event. The day started with a luncheon in the Mocca Room for all educational session speakers and branch officers.

The educational session opened in the Continental Room at 1:00 P.M. Secretary

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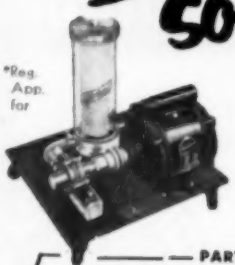

50-2400 GAL/HR.

Self-priming Model LSIN-10 . . . Cap. 100 gal/hr. H.T. Lucite Filter Assembly. Stainless pump . . . totally enclosed Motor . . . portable . . . Wt. 60 lbs. . . . 14 x 16" x 16" high.

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PARTIAL LIST OF MODELS

Model	Rated Capacity	Overall Size	Weight
LSI-5	50 gal/hr	11"x14"x12"	30 lbs.
LSI-10	100 gal/hr	12"x16"x16"	40 lbs.
ASI-300	300 gal/hr	2'x2'x2'	125 lbs.
ASI-600	600 gal/hr	2'x2'x2'	150 lbs.
RLS-1200	1800 gal/hr	2'x3'x3'	300 lbs.

SERVICE . . . Filters practically any acid or alkaline solution from pH 0 to pH 14; removes particles down to one micron in size. Strainer stops metallic objects.
DESIGN . . . **Filter Assembly** fabricated of stainless steel 316, high temperature lucite, rubber-lined, Haveg or Sethrin* resin. **Filter Tubes** of cotton, dynel, porous stone or porous carbon. **Pumps** fabricated of Hastelloy, stainless 316 or plastic; centrifugal or self-priming. **Motors** drip-proof, totally enclosed, or explosion proof, 110 or 220 volt, single or three-phase, 50 or 60 cycle, sleeve or ball bearing. **Hose** — special acid and alkali resistant. **Base** — Linen Phenolic laminate on rubber tire ball bearing casters.

Sethco MANUFACTURING COMPANY
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Branch News

John Dykstra operated a membership drive booth just outside the session room. He was able to sign up four new members and contacted several other very good prospects.

The educational session proved to be highly interesting and informative. We were happy to have **Cleve Nixon** as chairman. The first speaker was **Van Caldwell,** assistant editor of *Steel* magazine, who spoke on "Metallurgical Progress." **Ward Winkler,** assistant manager of product development, Titanium Metals Corporation of America, New York, spoke on "Production and Applications of Titanium." The last speaker was **L. C. Borchert,** vice-chairman of AES Research Committee, Houdaille-Hershey Corporation, Detroit, Mich. He reviewed the latest developments in AES research. Librarian **Tom Henner** and the speakers are to be complimented for the fine educational program they presented.

At 7:30 P.M. the banquet, attended by more than 470 members and guests, was held at the main ballroom. The ladies received a traveling clock as a favor.

To **Perry Burnham,** banquet chairman; **Jim Badaluco,** entertainment chairman; **Jack Hanney,** ticket chairman, and to all the branch officers and especially to president **Carl Green** for coordinating the complete program, congratulations for a fine party and thanks for a wonderful time.

The March 11 monthly dinner meeting of the Grand Rapids branch was attended by approximately 60 members. President **Green** read a letter from the National Secretary who complimented the Grand Rapids branch for its paper awards program.

The following men were appointed delegates to the National Convention: **Perry Burnham, Richard Watson** and **Donald Schantz.** Alternates were: **Rex McKercher, Steve Cowdery** and **Tony Preston.** A nominating committee consisting of **Lyman Sperry, Perry Burnham** and **Richard Watson** selected the following slate of officers for the coming year: President, **Perry Burnham;** 1st Vice-President, **Bob Blackford;** 2nd Vice-President, **Tom Henner;** Secretary, **Don Smith;** Treasurer, **Pat Norton;** Librarian, **John Dykstra;** Assistant Librarian, **Paul Waalkes;** Board of Managers (1 year), **Lyman Sperry.**

President Green was happy to announce the receiving of eleven new applicants. They were as follows: **Henriette Fikse** and **John VanderWarf** of the Jervis Corporation; **Robert N. Lewis** of Grand Rapids Metalcraft Corporation; **James L. Skar** of A.M.I., Incorporated; **John E. Gierre** from Udylite Corporation; **John E. Hammer** of Haviland Products Company; **Ronald Dow** from United Chromium Corporation; **R. J. Rosenback** of P. B. Gast & Sons Company; **John Peterson** from Diversey Corporation; **R. L. Ballou** and **W. L. Jolitz** of the Rudy Mfg. Company, Dowagiac, Mich. All applicants were promptly accepted as new members. This brings our membership to an all new high quota.

Perry Burnham introduced the speaker for the evening, **A. R. Burman** who spoke on "Pressure Blasting as a New Tool for Metal Finishing."

KENNETH HAMPEL,
Publicity

HARTFORD

The regular branch meeting was held at the Bond Hotel on March 21, with about 53 members and guests present. Preceeding the meeting a colored movie entitled "Die Castings—How Else Would You Make It" was shown. Following the movie **Ralph McCahan** reviewed the papers "Nickel Plating Troubles and Cures" and "Some Considerations of Importance in Ball Burnishing" presented at the last National Convention.

The guest speaker for the evening was **Harry L. Benner,** manager Plating Service and Development, Electrochemicals Dept. of E. I. duPont de Nemours Co., whose subject was "A New Versatile Improvement in Cyanide Copper Plating."

"U.S." white chemical porcelain cylindrical pots or rectangular tanks are ideal for pickling, plating or stripping small parts. They are corrosion-proof all the way through, possess excellent resistance to heat shock, are sturdy and durable. Their gleaming white surface improves solution visibility and makes for easy cleaning. Capacities from 2½ to 200 gallons in cylindrical pots; 4 to 40 gallons in rectangular tanks.

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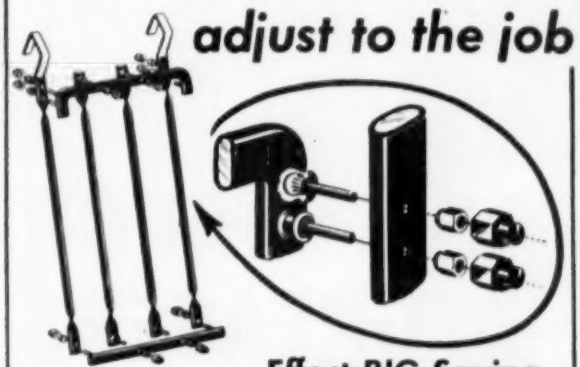

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Available as completely assembled racks or precoated rack members and tips.

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Branch News

Benner spoke of new addition agents for use in copper cyanide plating baths which plated copper semi-bright with good buffing properties. The advantages of cyanide copper plating were pointed out such as: good throwing power, capacity for bright plating, ductility of the copper, soft smooth deposits even when plated at fast speeds, etc. Factors causing bath contamination and methods for removing carbonates such as chilling, etc., were discussed. Many slides were used to illustrate the talk.

The technical chairman for the evening was **Armand Faucher.**

STANLEY PLATOZ,
Secretary

HOUSTON

The March meeting of the Houston branch was held March 22 at the Ben Milam Hotel with 11 members and four guests attending.

New officers elected for the coming year were: **H. L. Mauzy,** President; **Harold Hill,** 1st Vice-President; **Jasper Dee,** 2nd Vice-President; **H. C. Van Wagner,** Secretary-Treasurer, and **E. A. Schumacher,** Librarian.

Past President pins were presented to **J. R. Byerly** and **E. W. Ferguson.**

B. P. Studdert, president of the Houston Engineers Club, spoke on the club's expansion plans and how these plans will benefit local technical societies.

Speaker for the evening was **Walter Warner** of Kocour & Company, who talked on "Analytical Control of Electroplating Solutions" and demonstrated the Kocour Electronic Thickness Tester.

INDIANAPOLIS

Guests present at the March 2 meeting included **L. J. Howald** of Cincinnati branch and **John Lockerbie** of St. Joseph Valley branch. Thirty-two members and guests met at the Fox Steak House.

Concerning the meeting of the Tri-State Regional, **Herb Kennedy** reported that this is to be made permanent and a set of rules was read. **Abraham Max** made a motion that the Indianapolis branch participate as a full-fledged member. This was seconded by **Les Reynolds** and carried.

Jack Vaughan moved that president **Elmer Lundberg** appoint two representatives for the full period designated to represent the branch on Tri-State Regional group. This was seconded by **Harry Smith** and carried.

Lockerbie gave a short talk about the qualifications of **Duke Wysong** who is a member of the St. Joseph Valley branch and running for 3rd vice-president in the coming June election at Cleveland.

EDNA ROHRABAUGH,
Secretary

KANSAS CITY

The January meeting of the Kansas City branch was held at the Wishbone Restaurant. Dinner was served at 7:00 P.M., followed by the regular business meeting.

The speaker for the evening was **R. W. Redmond,** Murray-Way Corp. His subject, "Precleaning of Metals Prior to Plating," was very interesting and informative.

The film entitled "Chase Brass" was very well received.

The February meeting of the Kansas City Branch was held at the Wishbone Restaurant. Dinner was at 7:00 P.M., followed by the regular monthly business meeting.

A discussion regarding the annual stag party resulted in a motion being made and seconded that the K. C. Chapter sponsor a stag party in June. The motion was carried.

The speaker for the evening, **W. S. Hosford,** representing the G. A. Mosites Co., presented a very interesting and informative lecture, regarding the fabrication of tanks, ventilating systems and plating shop equipment from Rigid Unplasticized Polyvinyl Chloride.

The final event of the evening was the showing of a film depicting the operation of an Airline. The film and equipment was furnished with the compliments of Trans World Airlines, Inc.

RAMCO

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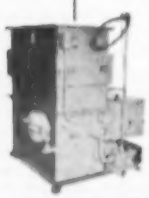

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Branch News

There being no further business, the meeting adjourned.

OLIN K. BOCK,
Secretary

LOS ANGELES

The monthly meeting of the Los Angeles branch was held March 9 at Rodger Young Auditorium, Los Angeles.

The membership chairman introduced four applicants for membership, and two men were initiated.

Larry O'Neal reported on the progress of preparations for the Annual Educational Session and Dinner-Dance.

Hayes and **Van Meter** of the Department of Water and Power spoke to the members concerning new regulations for the protection of the public water supplies by requiring back flow prevention devices on all plating shop service connections.

Librarian **Hetz** introduced the speaker of the evening, **Earl Waynick,** who spoke on plating room applications of polyvinyl chloride materials. After a question and answer period the meeting was adjourned.

The Los Angeles branch held its annual educational session and dinner-dance on March 19 at the Ambassador Hotel.

The first session started at 10:00 A.M. and was opened by **Larry O'Neil,** general chairman, who turned the meeting over to **George Hetz,** educational chairman. The first session was introduced by **Sidney Bart,** president of Sel-Rex Precious Metals. Included in his talk was a beautiful four-color motion picture showing the various and special applications in the electroplating industry. This proved to be most interesting and was enjoyed by all present. Following, was a talk by **Dr. Beckwith** of Harshaw Chemical Company. He covered the European situation in the plating field and told of the various advances made in Europe since World War II. Both talks were followed by an active question and answer period. At noon, the session was convened for lunch, which was held in the Coconut Grove with **Harold Smallman** as toastmaster. At this time, 50 prizes were awarded to the lucky ticket holders and everybody enjoyed the story-telling session that followed. At 1:30, the afternoon session began with a talk by **W. J. Crehan** of General American Transportation Corporation on "The Deposition of Electroless Nickel." The last talk of the afternoon session was given by **Will Castell** of Lockhead Aircraft Corporation on "Chemical Processing in the Aircraft Industry." The session was adjourned at 4:30 P.M. with many happy and well-informed members.

At 7:30 P.M. the dinner-dance opened in the Embassy room with a wonderful prime rib of beef dinner. During the dinner, **Don Bedwell** was honored on his 50th anniversary in the plating industry. Don, incidentally, was one of the founders of the Los Angeles branch. After dinner the drawing was started for the 250 door prizes, which is the big drawing card for this annual party. In between the drawings, there was dancing by Carroll Wax and his Orchestra. All told, this was the biggest party ever in the branch's history, there being almost 750 people at the dinner-dance.

Many thanks to the 123 contributors and donors of gifts, which were presented to the lucky ticket owners.

NORMAN K. MCEWAN,
Secretary

LOUISVILLE

The regular monthly meeting of the Louisville branch was held February 17, at Kapfhammer's Party House, Louisville.

Reports of special committees: **Wm. W. Francis,** chairman of the Exhibit committee, reported that the following people will contribute to the Exhibit for the AES National Convention to be held in Cleveland, June 20, 1955: **Stanley J. Beyer; Earl Bennett; E. W. Eckerle; Arthur A. Oertel; J. W. Scholl; Kenneth Buse; J. S. Houston.**

Two applications for membership were received from **James R. Smith** and **Harold G. Peters.**

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PIONEER *milled* neoprene stands extra hours of use in contact with oils, acids, caustics, detergents and disinfectants—has higher tensile, greater tear resistance than any other oil-resistant rubber.

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Branch News

President J. W. Scholl appointed Arthur A. Oertel to a one-year term and **Richard G. Marshall** to a two-year term, as delegates to the Tri-State Regional Meeting Committee.

President Scholl appointed the following to the nominating committee: S. J. Beyer, chairman; **P. H. Pate,** W. W. Francis and J. W. Scholl.

A motion was made by A. A. Oertel and passed that a new membership roster be made. The president appointed **J. G. Sterling** and S. J. Beyer to make up this roster.

President J. W. Scholl turned the meeting over to education chairman Stanley J. Beyer, who, after a brief talk, introduced **R. O. Hull,** president of the R. O. Hull Company, Rocky River, Ohio. He spoke on "Methods of Testing," which included methods of testing rectifiers, electroplates and Hull cell testing of plating solutions. Considerable discussion followed and Hull was given a rising vote of thanks for a very interesting talk.

A General Electric film, "A Is For Atom," was shown.

The meeting adjourned at 11:00 P.M.

J. G. STERLING,
Secretary-Treasurer

MELBOURNE

The annual meeting was held at the Melbourne Technical College on February 17.

In his report to the branch, the retiring president, **J. Parker,** summarized the activities of the branch throughout the year, covering the lectures, two of which had been given by branch members, plant visits, membership and a very successful annual dinner and smoke night.

Parker thanked all the committeemen and those members whose assistance he had received, which helped to make the year such a successful one.

New officers elected were: President, **P. Tikotin;** 1st Vice-President, **H. Littauer;** 2nd Vice-President, **B. Pearce;** Secretary-Treasurer, **B. Raeburn;** Librarian, **H. Teague;** Board of Managers: **J. Dale, H. Foster, H. Merton.**

The newly elected president, **P. Tikotin,** thanked the members for the confidence shown in him and also thanked the past president for his efforts during the year.

MICHIGAN

The March meeting of the Central Michigan branch was held at the Meadow Lark Inn, Jackson, Mich.

The G. L. Nankervis Company sponsored the meeting, and **Earl Stidell** of this organization introduced the speaker of the evening, **H. Geduld** of the R. O. Hull and Company.

Geduld took as his subject practical problems in bright zinc plating. The speaker outlined a step by step simple program for platers to follow in checking zinc plating operations when unable to obtain bright deposits. Geduld also furnished a written outline for a simple analytical method for zinc plating baths.

A film entitled "Echoes in War and Peace" was shown. This film was produced by the Bell Telephone Company.

Following the program a Board of Directors meeting was held and plans were made to again furnish an exhibit at the National Convention in Cleveland this summer. **R. L. Carter** and **R. W. Boos** were appointed delegate and alternate, respectively.

The Central Michigan branch wishes to extend its sincere appreciation to the G. L. Nankervis Company, H. Geduld and the R. O. Hull Company, and to the Bell Telephone Company.

R. W. Boos,
Publicity

MILWAUKEE

The annual Pabst Blue Ribbon Meeting was held on March 4 at Pabst. About 170 members and guests were present for the wonderful buffet luncheon preceeding the meeting. The president commended all the job shops that made the luncheon possible through their generous contributions.

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Branch News

At the abbreviated business meeting the following were nominated for next year's officers: President, **Herman Tessman**; 1st Vice-President, **Ray Goodsell**; 2nd Vice-President, **Gorden Einberger**; Secretary-Treasurer, **Cliff Peter**; Librarian, **Juel Severson**; Board of Managers, **Fred Anderson.**

Wm. Geissman was presented a pin for being a past president of the Milwaukee branch. An announcement was made that two new sustaining members were obtained in the Milwaukee area: Line Material Co., Milwaukee; Racine Plating Co., Racine.

A guest from Chicago, **Lew Glassner,** gave a short speech on the functions of the CEPI.

Art Linn introduced **M. Duesing** who showed a technicolor movie about Africa.

CLIFF PETER,
Secretary-Treasurer

NEW HAVEN

The regular meeting was called to order by vice-president **William Murray** on February 8 at the Mason Laboratory, Yale University.

After a short business meeting, technical chairman **Larry Durney** introduced the speaker of the evening, **Royal A. Brown** of the Egyptian Lacquer Manufacturing Corp., who gave a talk on lacquers and enamels.

The usual question and answer period gave the speaker an opportunity to deal specifically with organic finishing problems from a plater's standpoint.

B. J. GAFFNEY,
Secretary-Treasurer

NEWARK

Ladies' and Past Presidents' Night was held on March 18 with about 85 in attendance.

A brief business meeting followed the presentation of a colored travel film of the West by **Howard Cobb** during which **Joseph Azzolino, John Fiorita, Edward Herzig, Raymond Litterio** and **Salvatore Mollica** were elected to membership and applications were received from **Daniel Marino** and **James J. Shyne.**

Supreme Society past president **Franklyn J. MacStoker** then presented branch Past Presidents' pins to those in attendance who had served the branch in this capacity, beginning with the fourth president **Edward Faint** (1917) and including **Royal Clark, Roy Stout, George Reuter, Paul Oldam, Samuel Taylor, William Brubns, Howard Cobb, Zachary Irenas, Edwin Bowerman, Myron Diggin, Frank England, Robert Ehrhardt** and **Robert Horrocks.** A moment of silence was observed for the eleven deceased past presidents of Newark branch.

A. Amatore, M. Nadel, A. Fusco and **D. Clarin** of the New York branch were present at the meeting.

The nominating committee, Robert Horrocks, chairman; **L. Donroe** and F. England, submitted the following list of candidates: President, **Thomas Austin**; 1st Vice-President, **Clifford Struyk**; 2nd Vice-President, **William Grigat**; Secretary, **D. Gardner Foulke**; Treasurer, **George Wagner**; Librarian, **Gustav Bittrich**; Sergeant-at-Arms, **Dodd Carr**; Board of Managers: **Robert Ehrhardt, Robert Horrocks, John Gumm** and **George Reuter.** Delegates: **Louis Donroe, John Gumm** and **D. Gardner Foulke**; Alternate Delegates: **George Wagner, Myron Diggin** and **Robert Ehrhardt.**

No further nominations being received from the floor, it was moved and passed that the nominations be closed and the secretary cast a ballot for the nominees who were then installed by **MacStoker.** Outgoing president **John Gumm** was presented with a Past Presidents' Pin and incoming president **Tom Austin,** after calling for an adjournment of the business meeting, turned the meeting over to **Cliff Struyk** and **Gustav Bittrich** who were then installed by MacStoker. Outgoing president John Gumm was presented with a Past Presidents' Pin and incoming president Tom Austin, after calling for an adjournment of the business meeting, turned the meeting over to Cliff Struyk and Gustav Bittrich who directed an exciting game of Bingo. Prizes were provided by **John Banta** of Oakite Products, Inc.; Cliff Struyk of General Chemical Company; George Reuter of J. Wiss & Sons Co.; **Walter Prime** of International Nickel Company; George Wagner of Hy-Grade Plating Company; John Gumm of Frederick B. Gumm Chemical Company, and Don Foulke of Hanson-Van Winkle-Munning Company, and won by Mrs. **D. G. Foulke,** Mrs. **Fred Meyer** (twice), **C. La Manna, Sam Taylor,** Mrs. **Robert Horrocks** (twice), Ed Bowerman and the grand prize—a clock radio—went to **William Jancik.**

D. GARDNER FOULKE,
Secretary

PHILADELPHIA

The regular meeting at the Engineers' Club on February 25 was preceded by a dinner and attended by 45 members and guests, among whom was **Ronald D. Stewart** of Sydney, Australia. He gave a few brief impressions of the United States and extended to the branch the good wishes of the president of the Sydney branch.

Four new active members were accepted, and one application received. The nominating committee presented its slate of candidates for the 1955–1956 elections to be held March 25. Additional nominations were received from the floor for 2nd vice-president.

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INDICATE A 579.

Branch News

In lieu of the regularly scheduled speaker, **B. F. Ames,** Maas & Waldstein Co., being unable to attend, **Don P. Volino,** spoke in his stead, followed by **Roy F. Benjamin,** both of the same company. The subject was "New Developments in the Field of Organic Coatings." The items covered were those of interest to the electroplater, such as: water dip; clear baking of modified epoxy resin; silicones; clear dyed coatings over aluminum to simulate colored anodizing, and multicolored paint.

I. Wm. Marcovitch,
Secretary

PITTSBURGH

The March meeting of the Pittsburgh branch was held in the Avalon Room of the Sheraton Hotel.

We were honored to welcome three new members into our branch: **John R. Drobne, Millard F. Good,** and **Paul W. Rhodes.**

President **Bob Varner** reported the status of the Pittsburgh branch's bid to obtain the 1960 National Convention for Pittsburgh. Arrangements have been made in cooperation with the Pittsburgh Convention Bureau to obtain commitments from the hotels for sufficient air-conditioned rooms to handle everybody. By 1960 virtually all the downtown section known as the "Golden Triangle" will be composed of new, modernistic buildings. This, coupled with new parkways, most modern airport in the world, smoke elimination, new auditorium (hydraulic operated roof for open air operas and concerts), new parks and numerous other improvements have earned Pittsburgh the title of the "most progressive city in America." We really have something to show off and with the assured backing of the city's civic and business leaders, we know we can put on a Convention that will be worth attending. The branch is going all out to make arrangements for every phase of the convention at this early date.

Bob Woofter reported the executive committee's recommendation for an honorary membership for **Leo J. Schmitt** in the Pittsburgh branch. Leo has many years of service as one of the most active and hard-working members of our branch. He was one of the earliest members and worked hard towards building the branch to its present status. We are all well aware of his contributions to the Pittsburgh branch and its members, and the decision was unanimous to bestow honorary membership on Leo as a token of our esteem.

Election of officers for 1955–1956 was then held. The officers for next year are as follows: President, **Rudy Schindler;** 1st Vice-President, **Myron Ceresa;** 2nd Vice-President, **Fred Dixon;** Secretary, **Herb Schram;** Treasurer, **Bill Pizoli;** Librarian, **Jim Crain;** Delegates: **Bob Varner, Rudy Schindler** and **Myron Ceresa;** Alternates: **Ed Smith, Rex Goldbach** and **Bob Woofter.**

At the conclusion of the business session Bib Varner turned the meeting over to librarian Fred Dixon to introduce **Paul Schaffner** of the Schaffner Manufacturing Company, our speaker for the evening. Paul's talk was both very interesting and different from the usual type of subject we hear. He discussed the composition, manufacture, testing and use of polishing and buffing compounds. Covering the different types of lubricants used in the binders and the types and purpose for the various abrasives used, he was able to explain the necessity for the number of operations required before bright plating is possible.

Bob Schaffner drew the name for the monthly door prize. **Mike Vucich** of Weirton Steel was the fortunate winner of a Sunbeam Electric Frypan presented by the Schaffner boys of Schaffner Manufacturing Company.

Herb Schram,
Secretary

PORTLAND

On March 9 the branch held a joint meeting with the NACE (National Association of Corrosion Engineers).

We were pleased to welcome into the Portland branch **Dean Williams,** of the

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Branch News

L. H. Butcher Company, who was transferred from Los Angeles.

The speaker for the joint meeting was **Dr. Pierre Van Rysselberghe,** Professor of Chemistry at the University of Oregon at Eugene. Dr. Van Rysselberghe has long been interested in corrosion and has made major contributions to knowledge of this subject. His talk included a brief description of the construction of potential *p*H diagrams and a discussion of their use in establishing the conditions of potential and *p*H which will lead to immunity, passivity or corrosion.

The meeting was well attended and included representation from many industries in this area.

KEN HUMPHREY,
Secretary-Treasurer

ROCHESTER

The monthly meeting of the Rochester branch was held at the 40 & 8 Club on Monday, February 21.

President **Ed Wallin** announced the appointment of this year's nominating Committee—**Robert Graham, Cecil Thornton** and **Don Blum.**

More developments on the coming Regional Meeting to be held at the Hotel Seneca, Rochester, on April 16 were given. The Ladies' Program is to consist of a fashion show and tea-leaf reader. The speakers at the Educational Session, under the chairmanship of **Frank Beuckman,** are to be **Cleve Nixon,** Research Division of General Motors Corporation, on "Outdoor Durability of Decorative Finishes"; **Dr. Dodd Carr,** Bart Manufacturing, Inc., on "Nickel Electroforming"; and **D. R. Meserve,** United Chromium, Inc., on "Use of Vinyl Coatings in the Plating Industry."

Two elections were announced and approved: **James B. Devlin** and **Charles B. Clark.**

Librarian Frank Beuckman introduced **Paul W. Aradine,** chief chemist of Taylor Instrument Company, Rochester, who presented a very interesting talk on metal coatings on glass.

Frank then introduced the second speaker of the evening, **A. Korbelak,** sales manager for the Sel Rex Precious Metal Corporation, who spoke on "New Developments in Precious Metal Plating."

The March meeting of the Rochester branch was held at the 40 & 8 Club on March 21. Present were 32 members and guests.

Delegates and alternates to the forthcoming convention in Cleveland, Ohio, June 20–23 were announced as follows: Delegates: **William Tucker, Wellington Smith** and **Edwin Wallin.** Alternates: **Frank Beuckman, Roswell Minard** and **John Hourihan.**

The business session was then adjourned and the meeting was turned over to librarian **Frank Beuckman,** who introduced **Earl Reynolds,** chief metallurgist of Fasco Industries, who briefly and informatively spoke on "Chemical Control of Zinc Phosphating Solutions." Beuckman then introduced **William K. Murray,** technical service engineer of Enthone, Inc. Murray gave a talk on "Stripping of Electrodeposits," which was well received by all members, especially those concerned with the many problems of stripping deposits. Murray also conducted a short question and answer period.

FREDERICK L. JOHNSON,
Secretary

SAN ANTONIO

Meeting at El Charro Restaurant on February 14, the branch had a good discussion of the 1955 Convention and Industrial Finishing Exposition by **E. L. Combs** of Diamond Alkali, Chairman of the 1955 Convention. After this discussion Combs gave a complete picture of the chromic acid industry.

After further discussion by the membership on both subjects, the meeting adjourned with no business transacted.

The March 21 meeting was at the Belgium Inn and featured **Walter Warner** of Kocour Co., Chicago, whose talk and demonstration on "Plating Solution Analysis and Thickness Measurement" was well received.

An election of officers was held before

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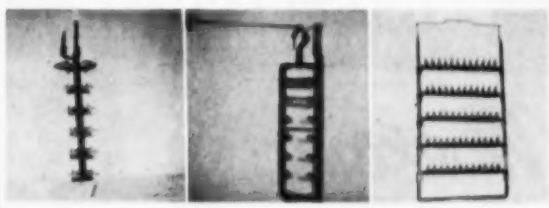

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USE READER SERVICE CARD; INDICATE A 583.

USE READER SERVICE CARD; INDICATE A 584.

Branch News

the discussion and the following were elected for the 1955 term: **Bill Wisdom,** President; **Joe C. Brown,** Vice-President; **T. H. Collard,** Secretary-Treasurer; **W. O. Phipps,** Librarian; Board Members: **Bill Nagle, H. V. Wells** and **Roy Rogers,** Chairman.

TOM COLLARD,
Publicity Chairman

SAN FRANCISCO

The regular monthly meeting was held at the Leamington Hotel in Oakland, Calif., on March 10.

Wallace Davis of Prescolite Company was the principal speaker of the evening amd his topic was "Metal Finishing in Industry." Davis stressed the importance of parts being highly finished for sales appeal. He pointed out the various methods of finishing wood, plated brass, copper plate, nickel and chrome. Door prizes were awarded by the Prescolite Company.

Nomination of officers for the 1955 fiscal year followed the speaker, and the following members were elected to office: **R. T. Coen,** President; **F. R. Dartt,** 1st Vice-President; **J. R. Pattenger,** 2nd Vice-President; **B. I. Trygstad,** Secretary; **J. E. Kettman,** Librarian; **R. L. Hefner,** Treasurer.

Two new members were elected to membership; **E. W. Schultz** of Pan-American World Airways and **John Butler** of Sylvania Electric Products Company.

F. W. BROWNING,
Secretary-Treasurer

SOUTHERN TIER

The Southern Tier branch held a meeting at the Iron Kettle Inn, Waverly, N. Y., on February 15.

The following delegates were elected to the annual convention to be held at Cleveland this year: **Charles Bound, Leonard Rood, George Zurenda.** The alternates chosen were: **William Karski, Stanley Stefanski** and **Charles Cordier.**

Stefanski introduced the guest speaker of the evening, **Richard Barrett** of the Barrett Chemical Products Company. His subject was on "Sulfamate Nickel Plating."

Sulfamic acid is similar to sulfuric acid in that it is inorganic. It is nearly as strong as sulfuric, hydrochloric and nitric acid, can be handled as a dry salt and is very soluble.

Barrett showed samples of the plating. One piece, an aluminum piston, had 0.001 inch thickness which was plated in five minutes.

All members present remarked that Barrett was one of the most interesting and informative speakers that the branch has heard this year. The meeting was adjourned at 10:55 P.M.

The Southern Tier branch held a meeting at the Ah-Wa-Ga Hotel, Owego, N. Y., on March 15.

The State Regional meeting to be held at Hotel Seneca, Rochester, N. Y., was announced. A letter from the Rochester branch president, **Ed Wallin** was read giving purpose and details of the meeting.

The Southern Tier branch will be represented officially by **Leonard Rood,** chairman; **Charles Bound** and **Stanley Stefanski.** Other members who intend to attend the meeting are **Harper, Harris, Johns, Rossiter, Fletcher, Wood, Zurenda, Ihrie, Cordier, Stanton,** and **Allis.**

Nominations for 1955 were made for elections to be held at the next meeting. They are as follows: President, **Charles Bound** and **Leonard Rood;** 1st Vice-President, **Charles Harris;** 2nd Vice-President, **Willis Wood;** Treasurer, **Merle Ihrie;** Librarian, **Stanley Stefanski;** Board of Managers: **George Zurenda,** chairman; **Kenneth Ashley,** and **Harold Harper.**

A special board meeting will be called by President **Zurenda.**

Will Jeffries of duPont was introduced by **Stefanski** as the guest speaker of the evening. The topic was "High-Speed du Pont Copper." He gave the history of copper plating mentioning that it was used some one hundred and fifty years

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Branch News

ago. Many papers describing numerous processes were published on copper plating. Copper plating is used as an underlay for nickel, particularly in the automotive industry. There are some two million gallons of copper plating solutions in use in the United States.

Jeffries described the Coppralyte solutions and the new additive "Addition Agent 1374." With the aid of slides he showed formulations of the baths and parts that were plated in the "Coppralyte" baths. High-speed plating and bright ductile parts were obtainable. Periodic reverse plating and interrupted current plating were two techniques described to be used with higher current densities for faster plating.

VINCENT T. MAXIAN,
Secretary

SPRINGFIELD

The March 28 meeting of the Springfield branch was held at Blake's Restaurant.

Two new members were accepted: **Elery C. Gibson** and **Guido Ariotti.** An application for associate membership was received from **Walter Dyber,** member of the Hartford branch and was held for future discussion.

Officers elected for the 1955–1956 season were: President, **Robert Girard;** 1st Vice-President, **Roger R. Heroux;** 2nd Vice-President, **Charles Griffin;** Secretary, **Henry L. Heissfeld;** Treasurer, **George H. Mongeau;** Librarian, **Edward Mahar;** Board of Managers: **Philip W. Sanders, Anthony S. Horta, Edward R. Dupuis, R. Minor Frost** and **John E. Costigan;** Research Chairman, **John E. Costigan;** Delegates: **Edward Mahar, Philip W. Prouty** and **Henry L. Heissfeld;** Alternates: **Edward R. Dupuis, Edward Koetsch, Jr.,** and **Anthony S. Horta.**

The technical session for the evening was a panel of four experts on the subject of "Plating Problems and Practices" with **Mike Shacat,** New England district manager of United Chromium, Inc.; **Ralph McCahan,** technical service representative for duPont; **Paul F. Lyman,** chief chemist and metallurgist for the Millers Falls Co.; and **George Haas,** sales engineer for Wyandotte Chemicals Corp., on the firing line. Questions and answers flew thick and fast, and a very enlightening evening was enjoyed by all.

HENRY L. HEISSFELD,
Secretary

ST. JOSEPH VALLEY

The regular meeting of the St. Joseph Valley branch was held at the Hotel Elkhart, Elkhart, Ind., on March 2. Thirty-one members and guests attended the dinner and 33 were present for the technical session.

Announcement was made of the Tri-State Meeting at Columbus, Ohio, and the Rockford, Ill., annual meeting. Several members from our branch will attend these meetings as well as the Indianapolis and Milwaukee Educational Meetings. The chairman of the nominating committee reported the slate of officers recommended for the coming year. The officers elected are: President, **Ralph Brouwer;** 1st Vice-President, **Eugene Roth;** 2nd Vice-President, **Donald Kraft;** Secretary-Treasurer, **Dr. Harold J. Wiesner;** Librarian, **Arthur G. Wiegand;** Delegates: **Ralph (Duke) Wysong, Ralph Brouwer** and **Harold J. Wiesner;** Alternates: **John Lockerbie, Eugene Roth** and **James Hedges.**

The annual stag party, sponsored by John Lockerbie, was announced for August 13 at John's cottage on Lake Wawasee.

President **John Bayman** turned the meeting over to Don Kraft, librarian, who introduced the guest speaker, **Dr. Leslie E. Lancy,** who spoke on "Integrated Waste Treatment for Electroplating."

Dr. Lancy answered several questions from the group present. The discussion of this method of waste treatment and the simple presentation of this subject was very educational.

EUGENE ROTH,
Secretary-Treasurer

SYRACUSE

The monthly meeting of the Syracuse branch was held at Richard's Restaurant, March 21. There were 43 members present for the dinner and 48 members present for the meeting.

Speaker of the evening was **J. J. Siefen,** president of the J. J. Siefen Co. Siefen's topic was "Liquid Spray Buffing Compounds, and Their Application."

The delegates and alternates for the National Convention were selected, as well as the following new officers of the branch: President, **Walter Piasecki;** 1st Vice-President, **Don Morris;** 2nd Vice-President, **Lindley S. Wood;** Treasurer, **Allen Gutekunst;** Secretary, **Arthur G. Martineau, Jr.;** Recording Secretary, **Frank Czech;** Librarian, **Gene Brost;** Assistant Librarian, **William Wood;** Board of Managers: **Vincent McConnell** (3 years); **Dan Gray** (2 years); **Ken Parnell** (1 year); **Alfred Hoehn** (1 year); **Art Overend** (1 year); **Floyd Kenyon** (1 year); **Niel Maffei** (1 year).

ARTHUR G. MARTINEAU, JR.,
Secretary

TWIN CITY

The March meeting of the branch was held in Minneapolis with **Ross Van Galder** of the Behr-Manning Company as the guest speaker. Van Galder presented two movies which described the manufacture

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1—3000/1500 AMPERE, 6/12 VOLT, **COLUMBIA,** Synchronous.
1—2500/1250 AMPERE, 8/16 VOLT, **ELECTRIC PRODUCTS,** Synchronous, Exciter-in-head.
1—2000/1000 AMPERE, 9/18 VOLT, **ELECTRIC PRODUCTS.**
1—1500/750 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING,** Synchronous, Exciter-in-head.
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1—1000/500 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS.**

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1—500 AMPERE, 25 VOLT, **CHANDEYSSON,** Synchronous, Exciter-in-head.
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Branch News

of abrasive cloths and belts and their utilization in industry. An open forum was held following the movies at which time Van Calder answered questions for the members.

The branch was honored by the attendance of **Clyde Kelly** of the American Plating Company who is 1st Vice-President of the National AES. Kelly gave a short speech on the activities and functions of the national organization.

Other guests present included **Fred Johnson** of the Jos. Walkerstorfer Company, **Loring Lister** of the R. C. Duncan Company, **Bill Forbes** of the W. D. Forbes Company, and **John Mitchell** of the Pako Corporation.

WATERBURY

On February 10 **Dr. Fred Lowenheim** of Metal and Thermit gave an excellent talk on "Tin Alloy Plating." A lively discussion followed.

The March meeting was held in the Colonial Room of the Hotel Elton on March 10. **Dr. Dubpernell** gave a complete review of the "Electroplating Handbook" by A. K. Graham. Following a movie on the "New York Giants—Highlights of 1954," **John A. Swift,** president, Swift Chemical Company, Canton, Conn., gave a fine talk entitled "Steel Compositions and Heat Treatments of Interest to the Plater." **Domenic Menchio** served as technical chairman.

W. P. Innes,
Publicity

WICHITA

On March 23 the Wichita branch attended a very enjoyable meeting at the El Charro. **Charles E. Brakenridge,** of Sarco Co., Inc., Chicago, spoke on the subject, "Temperature Controls in the Plating Industry."

The annual election of officers of the branch was held and the following were elected: President, **Ogle French;** Vice-President, **James Lewis;** Secretary, **Frank Swift;** Treasurer, **Leon Lawless;** Librarian, **Jack Pirrone;** Board (3 years): **Glen Summers and H. Michael.**

Russel H. Beatie,
Publicity Chairman

Claude L. Richardson

Claude L. Richardson, secretary-treasurer of Northern Star Plating Co., Rockford, Ill., died suddenly on February 21, 1955.

He was a member of the Rockford branch of the AES.

H. Archie Smith

H. Archie Smith, technical sales representative of Union Screen Plate Company of Canada, Ltd., died suddenly on February 27, 1955.

Smith had been associated with Union Screen Plate Company for a number of years and had become a recognized authority in the specialized field of industrial electroplating.

He was a member of the Ontario Association of Professional Engineers, Society of Plastics Engineers and Toronto Branch, AES.

NEW BRANCH CONTRIBUTOR TO RESEARCH FUND

The following AES Branch has recently subscribed to the AES Research Fund and is to be commended for joining other Branches in support of this important research effort:

Western Ontario—$100.

Above contribution is in addito the Branch per capita tax assessment.

DETROIT, SYDNEY AND WICHITA WINNERS IN 1954-1955 MEMBERSHIP COMPETITION

Detroit, Sydney (Australia) and Wichita emerged winners in the 1954–1955 branch membership competition concluded March 31. The 12-month drive brings AES membership to another all-time high.

Total membership as of March 31, 1955, including 318 Sustaining Members, 161 Members-at-Large and 6,382 Branch Members, is 6,861. This is an overall increase of 154 members or a 2.3 per cent increase over last year for the same period. Branch membership during the 1954–1955 fiscal year increased 158 over the previous year or an increase of 2.2 per cent.

The three winning branches will receive an award of $50 each at the forthcoming convention in Cleveland in recognition of their achievements.

First five leaders in each division are listed on the right.

MEMBERSHIP COMPETITION

First Division (126 members and over)

BRANCH	Members Mar. 31, 1954	New Members	Net Change Membership	Per Cent Change
1. Detroit	596	126½	+71.5	+12
2. Cleveland	246	35½	+14	+ 5.7
3. Toronto	136	23½	+ 5	+ 4.7
4. Grand Rapids	170	20½	+ 7.5	+ 4.4
5. Philadelphia	216	34	+ 9	+ 4.2

Second Division (70-125 members)

1. Sydney	81	11	+12	+14.8
2. San Francisco	74	14	+ 4½	+ 6.1
3. Twin City	73	9½	+ 3½	+ 5.6
4. New Haven	93	11	+ 5	+ 5.4
5. Dayton	87	13	+ 4½	+ 5.2

Third Division (10-69 members)

1. Wichita	34	16	+14	+14.1
2. Columbus	60	14½	+13½	+22.5
3. Central Michigan	51	19	+10	+19.6
4. Portland	18	10	+ 3	+16.7
5. Southeastern	48	8	+ 4	+ 8.3

AES News

Plating Staff Photo

FIRST AND TENTH AWARD RECIPIENT. Past President W. L. Pinner gives hearty congratulations to present AES leader, Dr. Ralph A. Schaefer. Pinner received first award of Order of Past Presidents ten years ago from the Baltimore-Washington Branch and Schaefer became tenth to receive the gold plated "receptacle" at the March 12 branch meeting

600 GUESTS ATTEND TRI-STATE REGIONAL MEETING

More than 600 AES members and guests attended the 2nd annual Tri-State Regional Meeting at the Deschler-Hilton Hotel in Columbus, Ohio, on March 26. Of this number, 100 took part in the afternoon educational session under the chairmanship of AES President R. A. Schaefer.

The affair proved to be highly successful, despite the freak blizzard which passed through that city during the day.

Sponsored by the AES branches of Cincinnati, Louisville, Columbus, Dayton and Indianapolis, the program included a tour of the Columbus Westinghouse Plant, an interesting educational session in the afternoon and a dinner-dance in the evening which featured top-flight entertainment, a delicious meal and dancing to the rhythms of a well-known recording orchesta.

Speakers who took part in the educational session included AES Past President **W. L. Pinner,** Houdaille-Hershey Corporation, who presented "The Present Status of AES Research Project No. 15"; **Myron B. Diggin,** Hanson-Van Winkle-Munning Co., who talked on "Specialized Nickel Plating Solution Applications"; and **B. D. Ostrow** of Lea-Ronal, Inc., who discussed "The Lea-Ronal Bright Copper Process."

Out-of-town dignitaries included **E. Combs,** chairman of the 42nd AES Convention Committee; AES Past President **C. P. Swift;** AES Third Vice-Presidential candidates **"Duke" Wysong** and **Herb Head;** National Honorary Member **John Lockerbie;** and AES Executive Secretary **P. Kovatis.**

TRI-STATE REGIONAL MEETING PLANNERS go over final arrangements for 2nd annual session held at Columbus, Ohio, on March 26. Standing, left to right: R. Skriletz, W. W. Denny, H. L. Moore, M. Pringel, E. Shaner, W. C. Shickner, E. A. Blount; J. E. Bride, seated: R. Jager, co-chairman; R. A. Schaefer, educational session chairman; W. J. Neill, program chairman; W. H. Safranek, chairman. (Absent when photo was taken: J. G. Beach, J. F. Soderberg, M. Farr, Jr.) *Plating Staff Photo*

Plating Staff Photo

AES Past President and National Honorary Member Clarence Van Derau, left, receives gold plated pot on behalf of Order of Past Presidents from AES Past President William J. Neill. Presentation occurred at 2nd Annual Tri-State Regional Meeting

The Robert S. Leather Mechanical Finishing Award

Robert S. Leather, founder and former President of The Lea Manufacturing Co., recognized many years ago the necessity for changing the buffing and polishing industry from an "art" to a "scientific method of surface finishing." To encourage qualified individuals who might be instrumental in bringing about this transition, The Lea Manufacturing Co. in 1950 granted an annual paper award called "The Lea Award," as an incentive for the best contribution to the knowledge and art of Mechanical Finishing.

Leather

After Leather's death in January 1954, in order to commemorate his many contributions to the finishing industry, the name of the "Lea Award" was changed to "The Robert S. Leather Award" established in recognition of the best annual contribution to the Knowledge and Art of Mechanical Finishing.

Administration of this award is made by a Paper Awards Committee of the American Electroplaters' Society. It is awarded at the Annual National American Electroplaters' Society Conventions.

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Lehigh University, Bethlehem, Pa.

Secretary.....P. PETER KOVATIS
445 Broad Street, Newark 2, N. J.

AES BRANCHES (Changes only)

CAPITOL DISTRICT meets first Monday of each month at Panetta's Restaurant, Menands, N. Y., at 7 P.M. for dinner, educational session at 8 P.M. Secretary, Charles Schenk, 1765 Lenox Rd., Schenectady, N. Y. Research finance committee chairman, Chester J. Klimek, 16 Southern Ave., Pittsfield, Mass.

CLEVELAND meets first Friday of each month in Hotel Carter at 8 P.M. Secretary-treasurer, R. I. Peters, 12901 Elmwood Ave., Cleveland, Ohio.

GRAND RAPIDS meets second Friday of each month at Fingers Restaurant at 7 P.M. for dinner, educational session at 8:15 P.M. Secretary, Don Smith, 1825 Martin, Grand Rapids, Mich. Research finance committee chairman, R. O. Watson, 3045 Kalamazoo S. E., Grand Rapids, Mich.

HOUSTON meets third Tuesday of each month at 7 P.M. in the Ben Milam Hotel, Houston, Texas. Secretary-treasurer, H. C. Van Wagner, c/o Barada & Page, 2812 Center St., Houston, Texas. Research finance committee chairman, O. L. Smith, 2903 W. Dallas, Houston, Texas.

MELBOURNE meets third Thursday of each month at 8 P.M. in Metallurgy Theatre, Melbourne Technical College, 124 Latrobe St. Honorary secretary-treasurer, B. Raeburn, Park Rd., Ringwood, Victoria, Australia.

PHILADELPHIA meets fourth Friday of each month at the Engineers' Club, 1317 Spruce St., Philadelphia, Pa. Secretary, I. William Marcovitch, 1302 St. Vincent St., Philadelphia, Pa. Research finance committee chairman, Herman P. Wright, 194 Atlantic Ave., Trenton, N. J.

SAGINAW VALLEY meets at Zehnder, Frankenmuth, Mich., second Wednesday of each month, September through May, except February, at 7 P.M. Secretary-treasurer, Raymond E. Gittins, 215 N. Birney, Bay City, Mich.

ST. JOSEPH VALLEY meets first Wednesday of each month at 8 P.M. in Hotel Elkhart, Elkhart, Ind. Secretary-treasurer, Harold J. Wiesner, 1016 Osolo Rd, Elkhart, Ind. Research finance committee chairman, Arthur G. Wiegand, 181 North Elkhart Ave., Elkhart, Ind.

SAN ANTONIO regular meeting date to be announced. Secretary-treasurer, T. H. Collard, 442 Pilgrim Drive, San Antonio, Texas.

SAN FRANCISCO meets second Thursday of each month, alternating between St. Julien Restaurant, 140 Battery St., San Francisco and El Curtola Restaurant, 510 17th St., Oakland. Secretary-treasurer, B. I. Trygstad, 1727 Oak St., Redwood City, California.

SEATTLE meets the third Tuesday of each month at the Stewart Hotel, Second and Stewart, Seattle, Wash. Secretary, Mrs. Helen Archibald, 17560 Tenth Ave., N. W., Seattle, Wash.

SPRINGFIELD meets fourth Monday of each month in Blakes Restaurant, 15 Market St., Springfield, Mass. Secretary, Henry L. Heissfeld, 74 Chilson St., Springfield, Mass. Research finance committee chairman, John E. Costigan, 74 Clairmont Place, Longmeadow, Mass.

SYRACUSE meets third Monday of each month in Richard's Restaurant, 106 Ashdale Ave., Syracuse, N. Y. Secretary, A. G. Martineau, Jr., 1024 Onondaga Ave., Syracuse, N. Y. Research finance committee chairman, K. S. Parnell, 126 Wood Ave., Syracuse, N. Y.

WESTERN ONTARIO meets third Friday of each month at the Bungalo Inn, Lambeth, Ontario at 9 P.M. Secretary-treasurer, Dave Mainland, 21 Maple St., Chatham, Ontario. Research finance committee chairman, Paul B. Croly, c/o Ontario Steel Products, Ltd., Chatham, Ontario.

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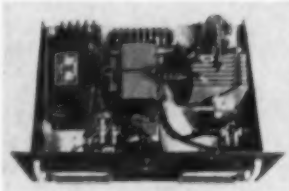

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American Institute of Chemical Engineers, Shamrock Hotel, Houston, Texas, May 1–4, 1955.

Electrochemical Society, Inc., Sheraton-Gibson Hotel, Cincinnati, Ohio, May 2–5, 1955.

2nd Annual Conference for Engineers and Architects, Ohio State University, Columbus, Ohio, May 6, 1955.

Toronto Branch, AES, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ontario, May 7, 1955.

17th Annual Banquet and Entertainment of the Masters' Electro-Plating Association, Inc., Plaza Hotel, New York City, May 7, 1955.

16th Annual New England Regional Meeting, AES, Hotel Statler, Hartford, Conn., May 14, 1955.

American Materials Handling Society, National Materials Handling Exposition, International Amphitheatre, Chicago, Ill., May 16–20, 1955.

9th General Convention of American Society for Quality Control, Hotel Statler and Hotel New Yorker, New York City, May 23–25, 1955.

American Welding Society, Municipal Auditorium, Kansas City, Mo., June 8–10, 1955.

American Society of Mechanical Engineers, Semi-Annual Meeting, Statler Hotel, Boston, Mass., June 20–23, 1955.

42nd Annual AES Convention and 4th Industrial Finishing Exposition, Municipal Auditorium, Cleveland, Ohio, June 20-23, 1955.

ASTM 58th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 26–July 1, 1955.

Western Plant Maintenance Show, Pan-Pacific Auditorium, Los Angeles, Calif., July 12–14, 1955.

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